

POPULAR MECHANICS

WRITTEN SO YOU CAN UNDERSTAND IT



WONDERFUL STAGE MECHANISM—THE GIANT'S HAND

\$887⁰⁰

BUYS THE MATERIAL NEEDED TO BUILD THIS HOUSE.



Price Includes Blue Prints; Architect's Specifications; Full Details; Working Plans and Typewritten Material List.

OUR HOUSE DESIGN No. 151.

In our house design No. 151 we show a modern eight-room house of the two story bungalow style. In size it is 24 feet wide by 32 ft. deep. The front porch is practically an out door living room, strictly private and is reached by a French window opening from the living room instead of the usual steps from the outside. The main entrance is on the side. The living room extends across the entire front of the house and is separated from the dining room by the stair hall. A coat closet is also provided on the first floor. Kitchen and pantry are of ample size. On the second floor are four large chambers and bath room, and four closets. The house is designed to be finished in Mission style and embodies every modern convenience. The construction is economical, the design harmonious, and in a general way this house appeals strongly to people of good taste. Our price for the material makes it an exceptional bargain, and those interested in building should write us.

Our price is a positive bargain, quality, style and finish of material we furnish guaranteed.

We Save You Big Money on Lumber and Building Material!

The Chicago House Wrecking Co. is the largest concern in the world devoted to the sale of Lumber, Plumbing, Heating Apparatus and Building Material direct to the consumer. No one else can make you an offer like the one shown above. We propose to furnish you everything needed for the construction of this building except Plumbing, Heating and Masonry material. Write for exact details of what we furnish. It will be in accordance with our specifications, which are so clear that there will be no possible misunderstanding.

now We Operate

We purchase at Sheriff's Sales, Receivers' Sales and Manufacturers' Sales, besides owning outright sawmills and lumber yards. Usually when you purchase your building material for the complete home shown above, elsewhere, it will cost you from 50 to 60 per cent more than we ask for it. By our "direct to you" methods we eliminate several middlemen's profits. We can prove this to you.

What Our Stock Consists of

We have everything needed in Building Material for a building of any sort. Lumber, Sash, Doors, Millwork, Structural Iron, Pipe, Valves and Fittings, Steel and Prepared Roofing. Our stock includes Dry Goods, Clothing, Furniture, Rugs, Groceries, etc., Machinery, Hardware, Wire Fencing—in fact, anything required to build or equip. Everything for the Home, the Office, the Factory or the Field, besides everything to wear or to eat. Send us your carpenter's or contractor's bill for our low estimate. We will prove our ability to save you money. **WRITE US TODAY**, giving a complete list of everything you need.

Free Book of Plans

We publish a handsome, illustrated book containing designs of Houses, Cottages, Bungalows, Barns, etc. We can furnish the material complete for any of these designs. This book is mailed free to those who correctly fill in the coupon below. Even if you have no immediate intention of building, we advise that you obtain a copy of our **FREE BOOK OF PLANS**. It's a valuable book.

Our Guarantee

This company has a capital stock and surplus of over \$1,000,000.00. Absolute satisfaction guaranteed in every detail. If you buy any material from us not as represented, we will take it back at our freight expense and return your money. We recognize the virtue of a satisfied customer. We will in every instance "Make Good." Thousands of satisfied customers prove this. We refer you to any bank or banker anywhere. Look us up in the Mercantile Agencies. Ask any Express Company. Write to the publisher of this publication. Our responsibility is unquestioned.

\$2.00 Buys a Complete Set of Blue Prints

We send you a set of plans for the house described above, including the necessary specifications and complete list of material, transportation and complete list of material. If you can place an order with us for complete bill of material, we will credit your account in full for the \$2.00 received, or we will allow you to return these plans, specification and list of materials to us and we will refund \$1.50, thereby making the total cost to you 50 cents.

High Grade Bathroom Outfits!



The price of this Bathroom Outfit \$37.50.

Plumbing material direct to you at Bargain prices. We have everything needed in Plumbing Material. Our prices mean a saving to you of 50 to 60 per cent. Here is an illustration of a bathroom outfit we are selling at \$37.50. Your plumber would ask you about \$90.00 for this same outfit. It is only one of many other complete outfits that we are offering at prices ranging from \$25.00 to \$50.00. Our catalog describes them in detail. Get our prices on Pipes and Fittings. Write us today.

Hot Air Furnaces!

Don't let the contract for your hot air furnace until you get our figures. We will cut your local dealer's price in half. We can furnish you a complete equipment including pipes, registers, furnace; everything required at a price not much more than what an ordinary heating stove would cost you. Complete hot air heating plants \$48.00 up. Get our heating catalog at once. Tells you all about it. Write us today. We guarantee to save you money. We loan you tools. We make you plans. Every heating plant we sell is backed by our guarantee bond.



Hot Water Heating Plants!

We guarantee to save you 50 to 75 per cent on a modern hot water heating plant for your home. We make you complete plans and instructions, and help you out every way we possibly can. We loan you tools. Every plant backed by our guarantee bond. We furnish the material; you get the plant installed. Cut out the local dealer's profit and cut the cost in half. Thousands of our plants installed and working perfectly in every part of the country. Write today for our Special Heating Catalog. Tells all about our heating proposition. We can furnish Heating Apparatus for any building, no matter how large. Tell us your needs.



Water Supply Outfits

Modern Air Pressure Water Supply Systems at prices ranging from \$18 to \$200. They are strictly new, first-class and complete in every detail. It makes no difference whether you live in the country, you can enjoy every city comfort at little expense. Why not investigate this? We are ready to furnish you with all facts free of charge. All material fully guaranteed. We also have a complete stock of Pipes, Valves and Fittings at 40 to 60 per cent saving. Gasoline engines at low prices.

Free Publications

Write for our Free Catalog. Fill in the coupon to the right and we will send such literature as best suits your needs. We publish a 1000 page mammoth catalog fully illustrated, giving our business history and showing all the vast lines of merchandise that we have for sale. We buy our goods at Sheriff's, Receivers' and Manufacturers' Sales. Ask for Catalog No. 539 Our Book on Plumbing and Heating Apparatus contains 150 pages of useful information. Our free "Book of Plans" is described elsewhere in this advertisement.

CHICAGO HOUSE WRECKING CO., 35th and Iron Sts., Chicago

Send Us This Coupon

Chicago House Wrecking Co. 539

I saw this ad in Pop. Mechanics

I am interested in _____

Name _____

Town _____

Co. _____ State _____

Are You Ambitious?



FOR a number of years THE NAVY has endeavored to fix a high standard for recruits. Owing to the steadily increasing demand for Navy positions, and the limited number of vacancies, the Navy Department has determined to raise still higher the requirements for enlistment, and to accept only picked men—morally, mentally and physically.

The Navy has much to offer the serious minded young man (or boy over 17) who is ambitious to make his life a success; who is eager to win advancement by his own efforts; and who wants to be assured of retirement with a competency in his declining years.

Ne'er-do-wells and adventurers need not try to join the Navy. Even should they pass the recruiting officer, they would not find the service to their liking, and their discharges would probably follow; but any honest, industrious young man, of sound physique and clean habits, can meet the requirements, and such young men are welcomed.

No man is urged to join the Navy. They are only asked to investigate Navy life; to talk it over with their parents. The best way to obtain a correct idea of Navy life is to read "The Making of a Man-O'-Warsman." It will be sent *free* on application.

Call at any Navy Recruiting Office, where all questions will be answered willingly by men who have had years of experience;—or address

BUREAU OF NAVIGATION

DESK 69

NAVY DEPARTMENT

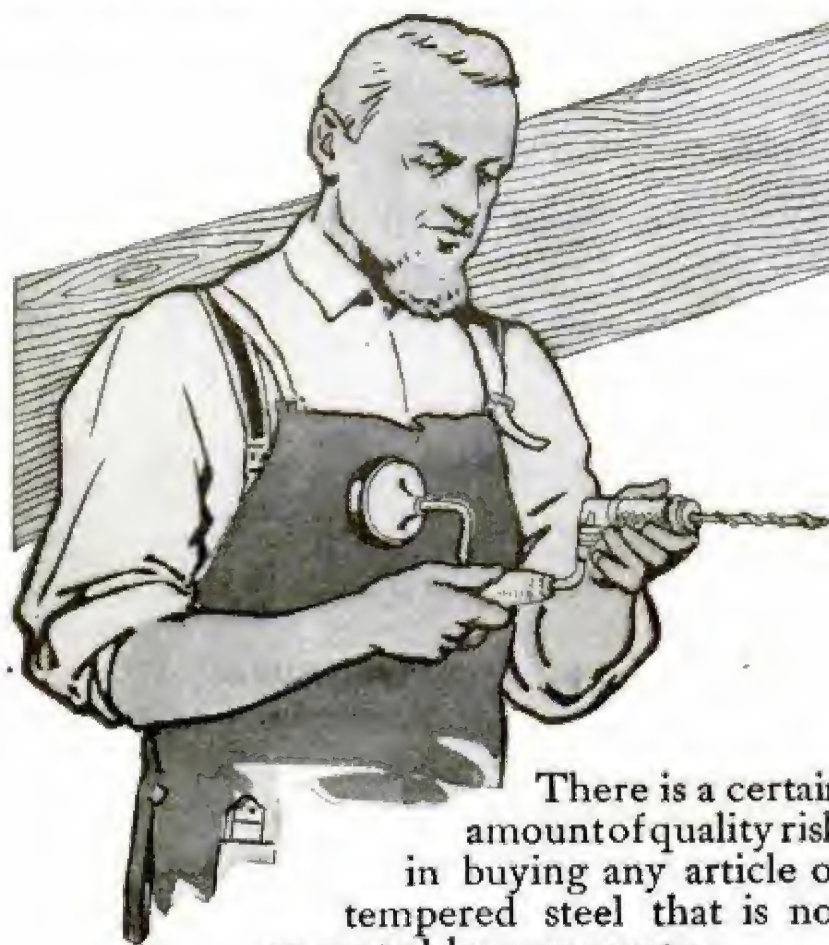
WASHINGTON, D. C.

This One



NARZ-NDZ-ZYEX

The Tool Is Right If It Bears this Mark



There is a certain amount of quality risk in buying any article of tempered steel that is not protected by a guarantee.

In the case of Keen Kutter Tools, the manufacturer assumes all risk instead of the purchaser.

Wherever you see tools or cutlery marked

KEEN KUTTER

you know they have been thoroughly tested and pronounced perfect. If imperfections should develop in quality of steel, temper, adjustment, balance; or, should the character of their work be unsatisfactory—your dealer will refund the money without question.

That is the meaning of the Keen Kutter Trademark.

That is the reason it gives absolute protection to the buyer.

That is why Keen Kutter Tools have been the Standard of America for over forty years.

If not at your dealer's, write us.

SIMMONS HARDWARE CO., Inc.
St. Louis and New York, U. S. A.

Please Mention Popular Mechanics



Your Dealer

has saws, axes, hammers, planes, bits, gimlets, chisels,—everything in fact for shop or bench; and also pocket knives, razors, shears, and table and kitchen cutlery—all backed by the Keen Kutter guarantee, which means *satisfaction or money back*.

"The Recollection of Quality Remains Long After the Price is Forgotten."

—E. C. SIMMONS
Trademark Registered.

POPULAR MECHANICS MAGAZINE

H. H. WINDSOR, EDITOR, 225 Washington St., CHICAGO, U. S. A.

Copyrighted, 1911, by H. H. Windsor.

Exchange Editors are at liberty to quote from these pages by giving the usual credit.

Contents for April, 1911

Lowering 300 Tons by Hand.....	463	Train Factory Hands to Avoid Fire Panic.....	501
Mustard Plaster Cures Elephantine Pain.....	464	Hoisting the Curtiss Aeroplane Aboard the "Pennsylvania".....	502
Homicide by an Aeroplane Newest Crime.....	465	Comment and Review, by H. H. Windsor.....	503
Wireless Operator Talks Through His Hat.....	465	Fighting Jack Frost.....	505
Perforated Wheelbarrows as Gravel Washers.....	466	Revolver Cigarette Case.....	508
British Favor American Raised-Cabin Cruiser.....	466	Atlantic Coast Canal Opened.....	509
Swim Required with Every Foot of Bore Casing Raised.....	466	Large Striking Clock for Massachusetts Mill.....	509
The Power of Automatic Pistols.....	468	Emergency Torches to Prevent Collisions.....	510
Geese and Horses Have Parts in Opera.....	468	Railroad Bridge Fringes Great Wall of Ice.....	510
Moving Pictures Show Aeroplane Fatality.....	469	Canal May Connect Lakes Ontario and Huron.....	511
Reduction-Gear Coupling for Turbo-Generator.....	469	Large Motorboat with Shallow Draft.....	511
Upset Does Not Damage Modern Fire Engine.....	470	This Fork is Easy to Clean.....	511
Preserving Live Bugs by Cold Storage.....	470	Battery Arrangements on Dreadnoughts.....	512
Forty Years Without a Single Holiday.....	470	New Automatic Flashing Light.....	513
Evils of Alcohol Extend to Photography.....	471	Making "Fake" Moving Pictures.....	513
Masked Mountaineers Who Are Not Outlaws.....	472	Helmet for Motorists No Thing of Beauty.....	516
Prevents Metal Rusting by Electricity.....	472	Centrifugal Spark Arrester.....	516
Electric Fireless Type Cookers.....	472	Wind Wagon-Boat is Now a Power Ice Sled.....	517
Motion Pictures Made to Talk.....	473	New Oxygen Process May Cheapen Smelting Cost.....	517
Motion Pictures with an Ordinary Magic Lantern.....	474	Microphotographic Libraries.....	518
Figurehead of "Idaho" Adorns Bandstand.....	475	Steel Trailers with Side Entrance and Exit.....	519
The Excavation of the Panama Canal.....	476	Tender Larger Than Vessel It Tends.....	519
Direction Signs for Airmen.....	477	The Giants in "Jack and the Beanstalk".....	520
Motorcycle Tubing as Storage Space.....	478	The Kingdom of Dust.....	521
Declarative Architecture.....	478	Jeweled Ring Guard.....	526
Wears Skull When Preaching of Death.....	479	What an S.3-In. Snowfall Means.....	526
Gyroscope for Motion-Picture Cameras.....	479	Saving Boys from "Blind Alley Occupations".....	526
Hidden Puff-Boxes.....	480	Chicago's Social-Center Economical Schools.....	527
Finding Firing Range with Binocular Device.....	480	Portable Airship Hangar.....	528
Europe to South America Short Route.....	481	The "Kiss of Death" in Cotton Manufacture.....	529
English Duck Trap.....	481	Cure Drunkenness by Eye Treatment.....	529
Communitistic Dwellings on Luxurious Scale.....	483	Telephone Saves Life of Western Lineman.....	529
Playing Checkers on a 24-Foot Board.....	484	French Motor-Driven Flue-Cleaner.....	530
Safety Helmet Drill on British Submarines.....	485	Valueless Pebbles are Traded for Gems.....	530
Electrical Handling of Mail.....	485	Kentuckian Makes Sleigh of Drygoods Box.....	530
Interesting Street-Car Seating Arrangement.....	486	Dutch Concrete Motorboat.....	531
Worm's-Eye View of London Steeple.....	486	Uncertainty of Radium.....	531
Pneumatic Paving-Block Tamper.....	487	A Direct Measurer of Illumination.....	532
Water Sterilization by Ultra-Violet Rays.....	487	Bohemians Make Butter from Oil.....	532
Tricycle Carts for Street Cleaners.....	488	Acrobatic Freight Car.....	532
Conveyor Used in Loading "Mauretania".....	488	Combined Aerial and Automobile Garage.....	533
Prize-Winning Design for Small House.....	489	Reinforced Telephone Apparatus.....	533
France Interested in Wright's Suit.....	490	Junk in Cylinder Stops Pumping Engine.....	533
Mail Carriers Use Autos in the West.....	491	Heat Does Not Affect This Skin.....	534
Plague-Proof Garments.....	491	Oil-Burning Engines in National Forests.....	534
Trousers Skirt Devised for Outdoor Wear.....	492	Dog a Valuable Aid to London Charity.....	534
Long-Distance Camera.....	492	Wind Wrecks Amusement-Park Structure.....	535
A Silk Bag for Facial Makeup.....	494	Simplified Marine Engine.....	535
Another Slide in Panama Canal.....	495	Comfortable Foot Muffs for Motorists.....	536
Light Flash Combined with Whistle Blast.....	495	Transferring Mails from Liner to Mailboat.....	536
Electricity Produced by Oil-Gas Power.....	496	Whistling Claimed to Stop Snoring.....	536
Record Aeroplane Flight with Passenger.....	496	National Touring Office.....	536
Safety Appliance to Stop Derailed Trains Automatically.....	498	The Making of Arts-Crafts Lamps.....	537
Pliers Avert Dangers of Long Hatpins.....	498	The Homesteading of England.....	538
Bridge Reconstructed in Less Than Two Hours.....	498	Ash-Sifting Hand Shovel.....	539
Aeroplane Carries Eight Persons.....	499	Concrete Tie with Wooden Rail Cushions.....	539
Oregon Plans New Lewis and Clark Monument.....	500	Correct to the Hundred-Thousandth of an Inch.....	538
The Kaiser "Purifies" the German Language.....	500	French Air Pump for Automobile.....	540
Ask Salvage for Balloon Under Maritime Law.....	500	Locking Weighing Tables for Locomotives.....	540
Cody Carries Passenger on Aero's Wing.....	500	Drives Tunnels by Heat and Cold.....	540
		Expansion Pliers.....	541
		Combination Wash Bowl and Dental Basin.....	541

[Continued on Page 6]

ISSUED MONTHLY

SUBSCRIPTION:

SINGLE COPY, 15 CENTS

In United States, and its possessions, and Mexico, per year, postpaid	\$1.50
To Canada	1.75
To all other countries in the Postal Union	2.00

All subscriptions are discontinued at expiration. Please examine the date printed on your wrapper.

Entered as Second Class Matter Sept. 15, 1903, at the Postoffice at Chicago, Illinois, under Act of March 3rd, 1879.

Published monthly by POPULAR MECHANICS CO.

The attention of prospective advertisers is called to the policy of this magazine in accordance with which the publisher waives all claim for payment of any advertisement appearing in any issue where the number of copies actually printed and circulated is less than the number printed on the front cover page.

Water Resistance of Ducks.....	578
San Francisco Gets the Fair.....	579
Sport for the Iron Worker.....	581
Electric Crane 172 Feet High.....	582
Cartridge-Making Machine.....	582
Sonnet on a Broken Test-Tube.....	582

Base Burner as a Supply-Water Heater.....	583
Holding a Revolver Steady.....	583
Fastening Bolts in the End of Bamboo Poles.....	584
A Toggle-Joint Press.....	584
Wheelbarrow Handle Shield.....	584
An Improvised Safety Light.....	584
How to Fold Overalls and Jumper.....	585
An Air Check Valve.....	585
Mechanical Helper for the Anvil.....	586
To Keep Windows Free from Frost.....	586
Calipering over Flanges.....	586
A Hot-Water Incubator.....	587
Foot-Operated Door Latch.....	588
Working Aluminum.....	588
Driving Nails in Brick Walls.....	589
A Mixing Stick.....	589
Removing Hot Nuts.....	589
A Tin Weather Strip for a Hinged Window.....	589
Babbitting Automobile Engine Bearings.....	590
A Garden Plow.....	590
Home-Made Water Still.....	590
A Time Regulator for a Furnace.....	591
Ice Scraper on a Broom Handle.....	592
Stovepipe and Stack Cleaner.....	592
Cutting Threads with a File.....	592
Self-Heating Soldering Iron.....	592
Heated Towel Rails.....	593
Milling in a Lathe.....	593
Clip for Holding a Trapdoor Open.....	594
Cutting Three-Cornered Pieces in a Sawmill.....	594
An Old Piston Used as a Pattern.....	594
A Method of Handling Liquid Manure.....	595
A Cistern Strainer.....	596
Painting the Bathtub.....	596
Labeling Barrels.....	597
Bail Holders for Buckets and Pails.....	597
A Temporary Chain Sprocket.....	597
A Double-Bladed Offset Screwdriver.....	597
Boiler Water Level Determined by Gauge-Glass Shadows.....	598
Pulleys for Aeroplane Construction.....	598
Quick Practical Method of Centering.....	598
Combination Square and Handsaw.....	599
An Aid to Cutting Threads in a Lathe.....	599
Repairing Rubber Shoe Heels.....	599
Lifting a Gate Covering from a Penstock.....	600
Home-Made Compasses.....	600
Preparing Calclimined Ceilings for Wallpaper.....	600
Automatic Weather Strip for a Door.....	600
Crankpin Truing Tool.....	601
A Taper Gauge.....	601
Gas Engine Muffler Made of Funnels.....	602
Metal Removed Between the Teeth of a Crosscut Saw.....	602
Home-Made Tobacco Moistener.....	602

A Letter Holder of Pierced Metal.....	603
An Electric Engine.....	604
Child's Home-Made Swing Seat.....	604
Home-Made Water Motor.....	605
Device for Baseball Throwing Practice.....	606
How to Mail Photographs.....	606
A Mystifying Watch Trick.....	607
Sharpening Skates with a File.....	608
Lines and Letters Made with a Carpenter's Pencil.....	609
Wood-Working for Beginners.....	609
Imitating Ground Glass.....	612
Restoring Tone to a Cracked Bell.....	612
Feed Box for Chickens.....	613
A Book Rest.....	613
Window Shelf for Flower Pots.....	613
Magnet for the Work Basket.....	613

Interesting Patents, Practical or Unique.....	614
Jokes	616
New Books	616

There's Money for You in Selling

Everyman's \$485

The Brush Runabout Car

IT is easy to sell people something they need and can afford. The Brush Runabout at \$485 is just such a proposition. People need it—all kinds of people, in every line of business. And the price is such that they can afford to buy it.

There is good profit for you in selling the Brush because you can make many sales and because your selling expenses are low. Your customers are all around you—no need for you to spend money travelling.

Field Is Unlimited

Every man (or employer of men) whose value depends on quick and economical transportation can use the Brush to advantage. For it is quicker, more reliable and cheaper to use than horse and buggy—costing a cent a mile or less to operate.

Salesmen, physicians, storekeepers, real estate men, insurance agents, contractors, plumbers, tax collectors, gas, electric and telephone companies—all need the Brush and are quick to realize it, when the proposition is put up to them.

These different businesses are just a suggestion of the big market for Brush Runabouts that exists already right in your own town. And just outside are the farmers—every farmer needs a Brush; they realize it, too.

Price Within Reach of All

There are few men engaged in business of any kind who cannot pay \$485 for something that will make or save money for them.

That's what makes it easy to sell the Brush. You can easily prove to your customer that the Brush will save him money. And when you've done that he isn't frightened by a big initial outlay.

Write for our proposition to dealers. Sending a postal may be the means of doubling your income.

Demand Is Increasing

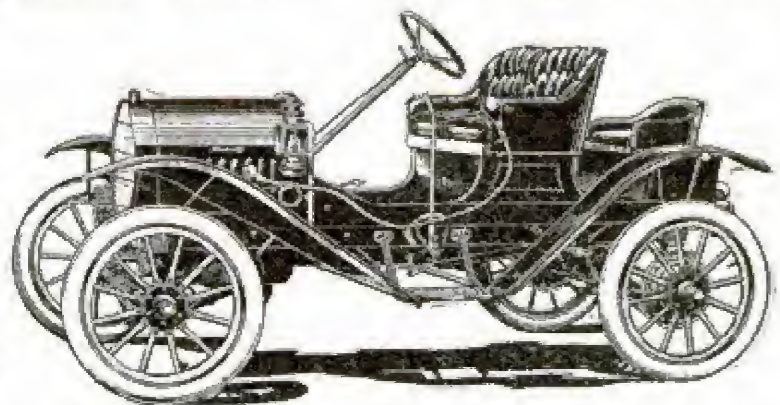
The Brush is already successfully employed in 84 different kinds of businesses—we want to send you a folder, "The Brush as a Commercial Asset," which gives names and photographs.

The demand is growing steadily every day as more and more people realize the adaptability of the Brush to their own business.

Easy for You to Sell

All that is necessary to sell the Brush is to tell its true story and show the car. We are telling the story for you all over the United States in our advertising. All **you** need to do is to call on the individual prospects in your own town and show them what the Brush will do.

You don't need to know a lot about automobiles and machinery to sell the Brush. It is the simplest car built.

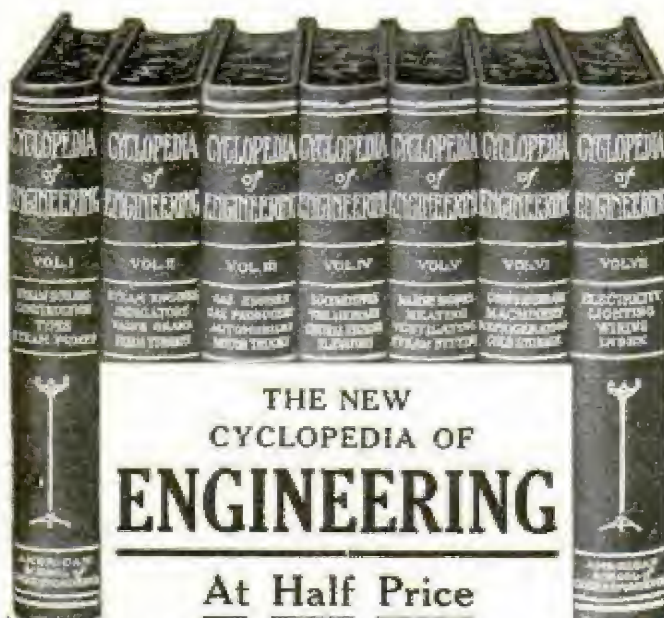


BRUSH RUNABOUT COMPANY,

(Division of United States Motor Company)

486 Rhode Island Ave.
DETROIT, MICH.

Licensed under Selden Patent



THE NEW CYCLOPEDIA OF ENGINEERING

At Half Price

Every Engineer must read if he would progress—the biggest men in the field can't go around telling what they know—but they can write it. And you can read it—in our New Cyclopedia of Engineering—the most valuable set of books on this subject ever offered to Engineers. This Cyclopedia has just been revised—it's right up to the minute.

These books cover every subject you are likely to meet in practical engineering. They are interestingly written by well-known authorities and are not only valuable for studying, but also as permanent reference books.

The seven books contain 3,200 pages, size 7x10 inches, and over 2,500 illustrations, full page plates, diagrams, etc. The regular price of these books is \$36.00, but as a special introductory offer we have put the price at \$18.80.

\$2.00 Down \$2.00 a Month

Shipped express prepaid so you can examine them
before paying a cent

This price and these terms make it easy for any engineer to secure the valuable set of books. Read the brief description below and see what you will get when you mail the coupon.

Our Protective Guarantee

Send for the Cyclopedia of Engineering, examine it carefully and if, at the end of five days, you see that you need it, send us your first \$2.00 and \$2.00 each month thereafter until the total, \$18.80, has been paid. If the books are not satisfactory—don't send us a cent—we will pay all charges. Use this coupon. We absolutely protect you against loss. Signing the coupon does not obligate you in any way.

READ THIS SYNOPSIS

Construction of Boilers—Boiler Accessories—Fuel Economizers—Mechanical Stokers—Steam Pumps—Steam Engines—Indicators—Valve Gears—Steam Turbines—Gas and Oil Engines—Fuels—Automobiles—Carburetors—Locomotive Boilers and Engines—The Air Brake—Single-Phase Electric Railway—Elevators—Marine Boilers—Marine Engines—Heating and Ventilating—Compressed Air—Transmission—Absorption and Compression Refrigeration—Ammonia Machines—Direct Current Dynamos and Motors—Management of Dynamos and Motors—Electric Wiring—Electric Lighting, etc.

For a short time we will include, as a monthly supplement, for one year, the TECHNICAL WORLD MAGAZINE. This is a regular \$1.50 monthly, full of Twentieth Century Scientific facts, written in popular form.

FREE EXAMINATION COUPON

American School of Correspondence
CHICAGO, U. S. A.

Please send set Cyclopedia of Engineering for 5 days' free examination. Also Technical World for 1 year. I will send \$2.00 within 5 days and \$2.00 a month until I have paid \$18.80; or notify you to send for the books. Title not to pass until fully paid. POP. MECH. 4-11

NAME

ADDRESS

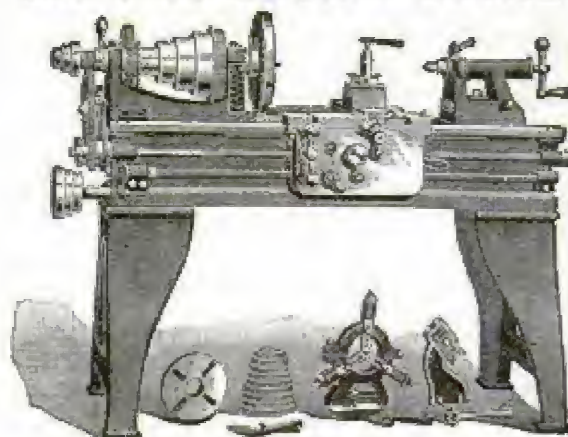
OCCUPATION

EMPLOYER

Please Mention Popular Mechanics

The Sebastian

15-Inch Standard High Grade
Low Price ENGINE LATHE



Automobile Builders, Garages, Repair Shops and General Jobbing Shops find this the Ideal Lathe for their work. Our Catalogue of Lathes and Tools Mailed FREE on request.

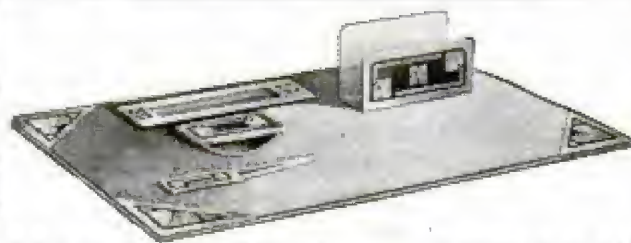
THE SEBASTIAN LATHE CO., 107 Culvert Street,
CINCINNATI, O.

Two Excellent Books for Those Who
Like to Make Things

Amateur Mechanics Nos. 1 and 2

PRICE 25 CENTS EACH POSTPAID

Popular Mechanics Book Department 225 Washington St.
CHICAGO



METAL WORK AND ETCHING

"WRITTEN SO YOU CAN UNDERSTAND IT"

By JOHN D. ADAMS

ONE OF THE LATEST of our series
of 25 cent industrial handbooks.

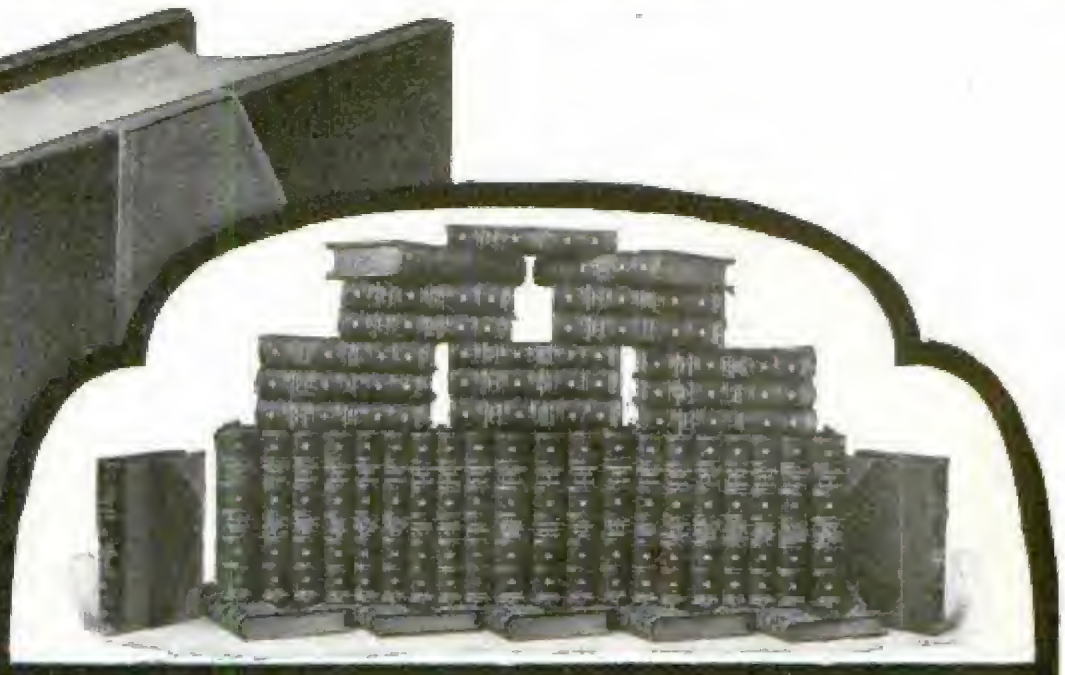
A complete manual for art metal workers giving every detail for making a great variety of useful and ornamental objects such as book ends, desk sets, pad corners, paper knives and letter openers, stationery racks, rocking blotter, desk calendars, match boxes, tie and pipe racks, whisk broom holders, candle sconce, arts and crafts jewelry, hinges, drawer pulls, etc.

96 PAGES—RICHLy ILLUSTRATED

Price 25 Cents, Postpaid

Order of your newsdealer, bookseller, or

Popular Mechanics Book Dept., Publishers, Chicago



The Greatest Technical Library in the World

At an original cost of over one million dollars there has been prepared 99 Volumes of the International Library of Technology. This Library contains the knowledge obtained through years of experience by the greatest business, manufacturing, and engineering concerns in the world. The matter has been written by the best technical experts obtainable and illustrated by a special staff of artists and draftsmen. In these books are found the best modern methods of American engineering, shop, field, mine, and laboratory practice. It is the only practical technical library in existence that can be readily understood and practically applied by those having no knowledge of higher mathematics.

Edwin S. Cramp, vice-president of the William Cramp & Sons Ship and Engine Building Company, of Philadelphia, states:

"I have examined the International Library of Technology and have no hesitancy in saying that it is the most complete set of technical books that I have ever had the pleasure of placing in my book case. The thoroughness with which you go into the various subjects is marvelous."

The Library contains over 42,000 pages and 20,000 illustrations; 99 Volumes durably and handsomely bound in three-fourths red morocco, stamped and numbered in gold. The type is large and easy to read and is printed on a high-grade book paper. Each volume is 6 by 9 inches in size. The Library is sold in sets of 5 or more Volumes.

This storehouse of the world's best technical brains awaits to help you advance, to broaden and better yourself. Send us this coupon NOW.

INTERNATIONAL TEXTBOOK COMPANY

Box 872, Scranton, Pa.

Please send, without further obligation to me, full description and particulars regarding the International Library of Technology.

Name _____

St. and No. _____

City _____ State _____

"I am now driving 'Winton Six'—Do all my repair work—Owe it to your course."—E. W. Sawyer, Montclair, N. J.
 "An opening Garage and Repair Shop since taking your course."—F. J. Hany, Lewisburg, Ohio. Let us show you many others.

LEARN TO RUN & REPAIR AUTOMOBILES. YOU CAN

LEARN THE AUTOMOBILE TRADE
The Best Profession in the World



THEY WORK
MAGNETO MODEL



THEY WORK
CARBURETTOR MODEL



SEE HOW AN AUTO IS CONSTRUCTED.

It's Easy WITH DYKE'S NEW SYSTEM

I Will Teach You Right in Your Own Home, during spare time and quicker and more thorough than you could learn in years around a car—Because in addition to Dyke's New Revised Home Study Course of 29 complete Instructions (or 12 Books) and 120 Charts, we include absolutely free several

Working Models

of parts of the Automobile (see Illustrations) for you to actually see the principle, construction and practice valve setting—timing ignition—setting the magneto, etc. Barney Oldfield says—"A person surely can learn with your system."

If Others Can Learn, You Can—We will send you testimonials from hundreds.

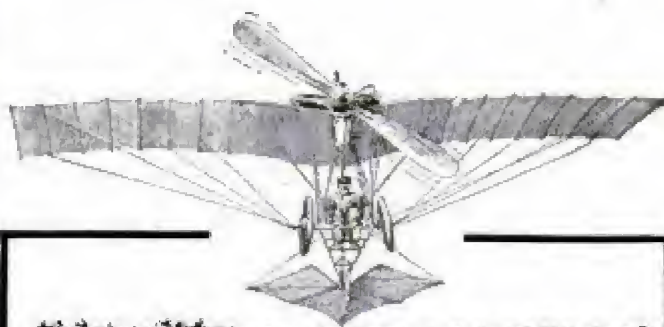
Ten Dollars Covers All—Others charge \$20 to \$40—and not near so complete—We send on approval—everything goes at one time—Diploma when you finish.

FREE: 24 Page Book—"How to get into the Auto Business"

Don't Miss It! Write Today!

DYKE'S COR'P. SCHOOL MOTORING,
Box 1 —3947 Washington, ST. LOUIS

**MANIKIN
OF AN
AUTOMOBILE**
TAKE IT APART.



Working Drawings of Santos-Dumont's Remarkable Aeroplane The "Demoiselle"

PRICE POSTPAID \$2.00

Complete plans for the construction of the wonderful monoplane offered to the public now for the first time.

The Smallest Flyer Ever Built—One of the Most Successful

The machine is unencumbered by patent rights, the famous aviator preferring to place his invention at the disposal of the world in the interest of the art to which he has devoted his life. These plans were published in two parts, in the June and July, 1910, numbers of Popular Mechanics Magazine, but the restrictions of space made them much smaller. They were secured by representatives of Popular Mechanics from Santos-Dumont, and are the result of consultations with his engineers and observations made at his workshops.

The set comprises seven large blue prints, showing every detail of construction, accompanied by a description of how to build.

Address

**Popular Mechanics Book Department
CHICAGO**

MANUFACTURE DENATURED ALCOHOL From Farm Waste and MAKE BIG MONEY

WRIGHT'S book, "THE DISTILLATION OF ALCOHOL" tells you how to do it. 2nd edition considerably enlarged. Now ready. Price \$1.10 postpaid.

SPON & CHAMBERLAIN
123 P. M. Liberty Street
NEW YORK, U. S. A.

**WHEN YOU WANT ANYTHING AND DON'T KNOW
WHERE TO FIND IT—WRITE BUREAU OF
INFORMATION, POPULAR MECHANICS, CHICAGO**

Mechanics For Young America

A book which tells how to make scores of articles which delight the heart of the average boy. Price 25 Cents Postpaid

POPULAR MECHANICS BOOK DEPT.
225 Washington Street, CHICAGO

SOMETHING NEW

Lithographic Models

OF SIX SUBJECTS

*Wireless Telegraph—Motor Car
Gas Engine—Dynamo
Steam Turbine and Steam Engine*

Size 8 x 14 inches

50c each Complete Set of Six \$2.50 postpaid

THESE models are of great value as a means of graphically showing all the interrelated parts of the above named mechanisms by virtue of their construction, which is similar to that of educational manikins of the human body and organs, with which nearly everyone is familiar. Beginning with the outermost or surface parts of the gas engine, for example, these are all differently colored and numbered to correspond to a printed key of names which comes with each model. By means of their hinge-like attachment, they may then be lifted, thereby disclosing to view the layer of parts next underneath, exactly as they would be in the engine itself, and so on until the innermost construction is shown. We are sole agents in this country.

ADDRESS

POPULAR MECHANICS CO.
225 Washington Street, CHICAGO



Henry Dickson

America's foremost authority on Memory Training, Public Speaking, Self Expression, and Principal of the Dickson Memory School, Auditorium Building, Chicago.

More About Remembering

ARTICLE II.

(IF YOU DID NOT READ ARTICLE I, SEE LAST MONTH'S POPULAR MECHANICS)

LAST MONTH ELBERT HUBBARD told the readers of POPULAR MECHANICS something about my School of Memory. HUBBARD knows that the men I am helping most are you Managers, Secretaries, Teachers—men and women in business who need the Quick Thought, Accurate Judgment, Unhesitating Decision—in short, the Responsive Memory which presents Facts to you when Facts are needed. HUBBARD recommended my System to you because he knows that hundreds of readers of POPULAR MECHANICS have already raised their standard of efficiency by taking my method. Now I am addressing you personally. Increased efficiency, greater abilities, higher standards are all for you, my booklet will explain. Simply cut out and mail coupon below. Accuracy of Memory is not all that is covered by my method. Remember the man who was called upon to speak—He arose, stammered, sucked air, gurgled ice-water—forgot—and sat down in the kindly silence. Memory in Relation to Public Speaking was what he required. That is one of the

many subjects in my Method. It is very simple; you do not realize the capacity of your own brain until you have put it through a few easy exercises. Ability is latent within you, simply it needs developing. You will be surprised to note how quickly and accurately a *trained* faculty responds.

A TRAINED MEMORY IS MAN'S GREATEST ASSET

Dickson's How to Speak in Public

De luxe edition, handsomely illustrated, richly bound. Is full of carefully selected material exactly suited to meet the needs of the man or woman who desires to be a successful public speaker.

Success in Life depends on what you say and how you say it. This book of mine on Public Speaking and Self

Expression is based on my 30 years of success as an instructor in Public Speaking in Chicago University, University of Notre Dame, and other well known schools. Taken in connection with my memory training, you can obtain a far better and more useful education than is afforded by many of the best universities. The price of this 1911 de luxe edition is \$2.00. I will, however, present a copy absolutely free to every student who enrolls for my course of memory training within ten days after reading this offer.

The ability to think on your feet, to focus your mind instantly and voice your thoughts unhesitatingly, interestingly, makes you a leader of men—and it's worth while.

You Can Have This Training

No matter where you live, what your vocation, or what your age, my course will make you infinitely more successful. Only ten minutes a day—no tedious lessons, only a simple method which teaches you—

How to remember names and faces of people you meet. How to focus your mind instantly on the points of a business proposition. How to commit a speech or toast to memory quickly, and deliver it unhesitatingly. How to converse at social gatherings in a natural, interesting way that wins friends. How to overcome self-consciousness, bashfulness. How to control your mind. How to memorize for studies, examinations, etc.

The Dickson System of Memory Training has been highly recommended by such notables as Elbert Hubbard, Prof. David Swing, Dr. Latson and thousands of others.

The fame of this unique and successful system has spread over the entire country, and its successful graduates fill every walk in business, political and professional activity. While the weakest memories can be strengthened—many of the most intellectual men of the day have availed themselves of memory training.

Fill Out and Mail Coupon Today If You Would Be Successful

Prof. Henry Dickson, Principal, Dickson Memory School.

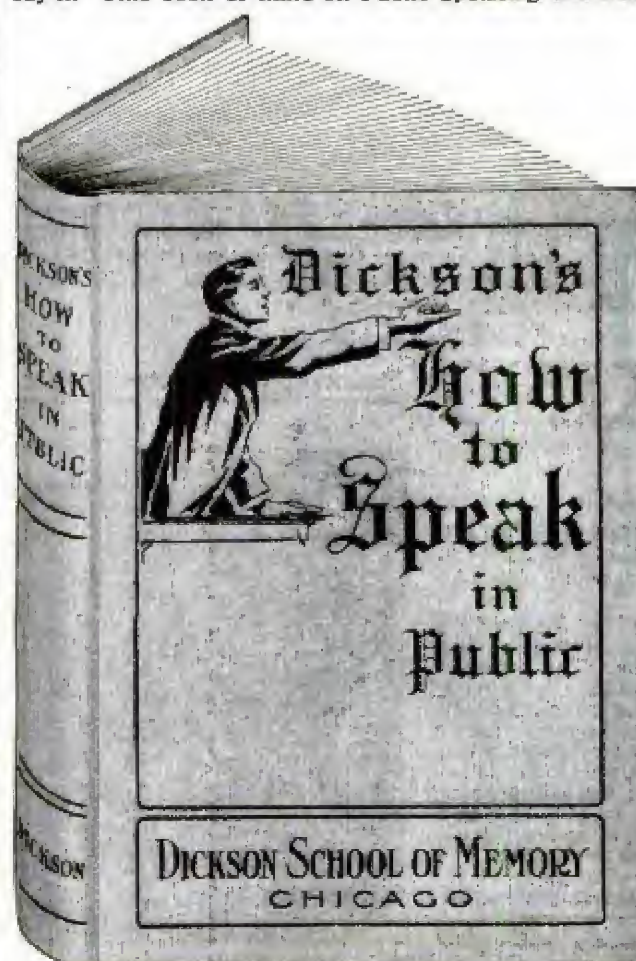
705 Auditorium Building, Chicago, Ill.

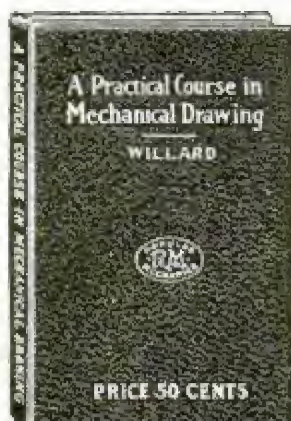
Send me free booklet "How to Remember," also full particulars how to obtain a free copy of "Dickson's How to Speak in Public."

NAME.....

STREET.....

CITY..... STATE.....





A NEW BOOK FOR WHICH THERE IS A REAL NEED

A PRACTICAL COURSE IN MECHANICAL DRAWING

"Written So You Can Understand It"

By WM. F. WILLARD

(For several years instructor in Mechanical Drawing at Armour Institute of Technology, Chicago.)

134 Pages
131 Illustrations

Price 50 Cents
POSTPAID

Cloth Cover
Size, 5x7 Inches

A book for individual study, shop classes, trade or high schools, and those who would like to know something of the DRAFTING PROFESSION.

WHAT OTHERS SAY ABOUT IT:

"It is one of the best books on Practical Mechanical Drawing I have ever seen and I can recommend it to any one who desires to make an individual study of drawing."

E. S. LIBBY, B.S., M.E., Prof. in Experimental Engineering, Armour Institute.

"This is a very useful little book, and every young fellow who is desirous of making himself more valuable to both himself and his employer will find it a great help in 'boosting' himself to a higher plane and 'bigger pay.'"

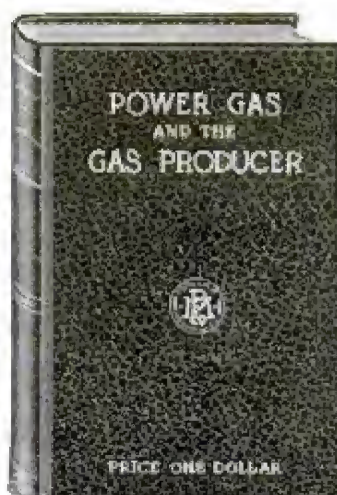
—THE NATIONAL BUILDER.

POWER GAS AND THE GAS PRODUCER

"Written So You Can Understand It"

By J. C. MILLER, M. E.

The only authentic reference manual covering every detail of installation and operation which has been written in a non-technical manner. This book was prepared especially for the inquirer in this field who would like to be able to judge intelligently as to the economy and advisability of changing from other forms to Producer operation. It will also appeal to the engineer who wishes to understand thoroughly the working of the new system and thus be prepared to handle a plant competently.



One handsome, cloth bound volume of 192 pages, printed on the best quality of book paper and profusely illustrated.

Price
Post-
Paid **\$1**

The following list of chapter headings shows how thoroughly the author has covered his subject: Producer Gas and the Gas Producer—Classes of Gas Producers—Industrial Gases—Comparison of Heat Values—Types of Producers—Gas Producer Fuels—Gas Producer Operation—Gas Power and Steam Compared—Reliability of Gas Power—Gas and Steam Power Costs—Gas Producer Installation—Alphabetical Index.

PATTERN-MAKING

Price **\$1** Postpaid

By G. H. WILLARD

WITH ADDITIONAL CHAPTERS ON

CORE-MAKING AND MOLDING

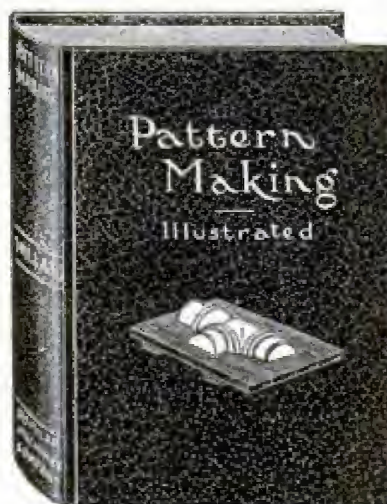
"Written So You Can Understand It"

A book for the man who has to do the work. Written by a practical pattern-maker of many years' experience. Gets right down to business in the first chapter and keeps it up throughout the book. Full of kinks and actual working information. Profusely illustrated. Every one following this trade, or intending to learn it, should have a copy of this valuable book.

224 Pages, 312 Illustrations., Cloth Cover

"Ten chapters are devoted to careful instruction for the making of specific patterns. The patterns chosen are of gradually increasing difficulty and cover practically all the points that come up in ordinary practice. Considering especially the low price of \$1.00, this book is remarkably practical and comprehensive. It is written in a style much more readable and effective than is usual with books on this subject."

—Engineering News.



POPULAR MECHANICS BOOK DEPT., PUBLISHERS, CHICAGO

6 Important Books For Electrical Men



Bound in Half Morocco,
3,500 Pages,
1900 Illustrations,
Page Plates,
Etc.

We Want You to Examine These Books FREE OF CHARGE

They are just what you want if interested in any branch of electrical engineering. We want you to examine the complete set at our expense.

This Great Cyclopedia of **Applied Electricity**

is written by thirty expert electrical engineers—the biggest men in the profession. It is especially designed as a working guide for the student and ready reference for the expert. *Their reference value is guaranteed* because they are compiled from the regular text books used in the correspondence courses of the American School of Correspondence.

You Take No Risk. Examine the books five days at our expense. So confident are we that the books are just what you want, that we will send them to you by prepaid express. Keep them five days, test them—apply them to your every-day work. If satisfied that they are the most complete and comprehensive work ever published on Electricity, keep them and send us \$2.00, then pay \$2.00 a month until you have paid our special introductory price of \$18.80. The regular price is \$36.00. If the books do not satisfy you and are not just what we claim them to be, notify us and we will have them returned at our expense. Just fill in and send the coupon. *The books will be sent to you free.*

IMPORTANT SUBJECTS TREATED IN DETAIL

Electric Wiring—Electric Telegraph—Wireless Telegraphy—Telautograph—Theory, Calculation, Design and Construction of Generators and Motors—Types of Dynamos and Motors—Elevators—Direct Current Motors—Direct-Driven Machine Shop Tools—Electric Lighting—Electric Railways—Alternating Current Motors—Single Phase Electric Railway—Management of Dynamos and Motors—Power Stations—Central Station Engineering—Storage Batteries—Power Transmission—Alternating Current Machinery—Telephony—Automatic Telephone—Wireless Telephony—Telegraphone, etc.

For a short time we will include, as a monthly supplement, for one year, the **TECHNICAL WORLD MAGAZINE**. This is a regular \$1.50 monthly, full of Twentieth Century Scientific facts, written in popular form. Also contains the latest discussions on timely topics in invention, discovery, industry, etc.

AMERICAN SCHOOL OF CORRESPONDENCE
CHICAGO, U. S. A.

FREE EXAMINATION COUPON

A. S. of C.
Please send me Cyclopedia of Applied Electricity for five days' free examination. Also T. W. for one year. I will send \$2 within five days and \$2 a month until I have paid \$18.80 for books and magazine, otherwise I will notify you and hold the books subject to your order. Title not to pass until fully paid.

NAME.....
ADDRESS.....
OCCUPATION.....
EMPLOYER.....

Shop Notes Quarterly

for the second quarter of 1911 will be an unusually interesting number.

READY APRIL 1

Among the special features are: "Liquid Fuels of the Future," by J. C. Miller, M. E.; "The Steam-Engine Indicator," a plain, practical treatise by L. Stinson, M. E.; "Files and Filing," the first of a series of practical articles on the making and use of tools, by Henry Farrington, M.Sc.; "Art in American Architecture," by F. J. Schulte; "Modern Sanitary Plumbing," by Thomas J. Claffey; "The Lost-Wax Process of Ornamental Molding," by Cliff M. Bleyer; "Electricity on the Farm," by M. A. Johnston; "Recent Progress in Electric Lighting," by E. W. Marchant, D. Sc.; "Interchangeable Involute Gearing," by Wilfred Lewis; "Wood and Timber," by W. L. Hammons; "Designing from Plant Forms," with twelve examples by John W. Wadsworth. The regular departments devoted to shop kinks, data sheets, drafting-room notes, etc., will be unusually replete.

210 Compact Pages — 300 Illustrations

Each number contains more than three times as much reading-matter as the ordinary 15-cent magazine. An alphabetical index makes all the contents available for ready reference. Shop Notes Quarterly is the largest publication in the world devoted exclusively to Mechanics, Science, and Practical Knowledge.

\$1.00 a Year—Ask the Newsdealer—25c a Copy

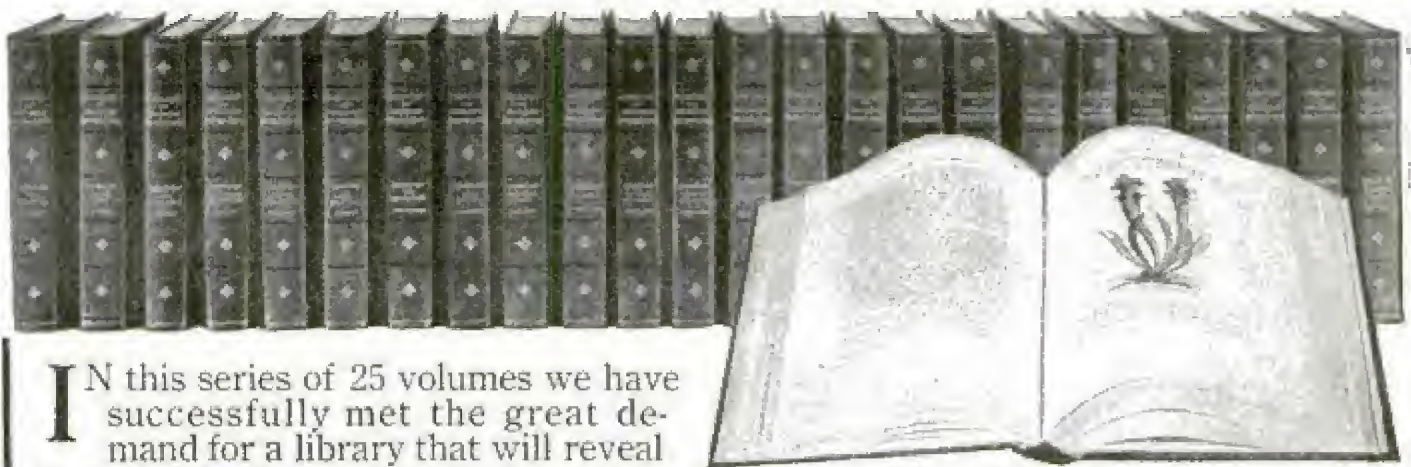
Popular Mechanics Co., 225 Washington St., Chicago

25
Fascinating
Volumes
25

The Library of Valuable Knowledge

"The Fairy Tales of Science"

1,000
Unusual
Illustrations
1,000



IN this series of 25 volumes we have successfully met the great demand for a library that will reveal in an interesting and entertaining way the wonders of the universe and the history of man's accomplishment. Eminent scientists have sorted, sifted, and arranged the scientific knowledge of today, and have made some of the most interesting fact-stories that have ever been put into print. The men who prepared these volumes not only knew their subject, but they knew how to present it in a popular and pleasing way. It is just as if you were attending a course of public lectures where a group of eloquent experts were explaining for your benefit the wonderful truths they had learned, making all nature speak to you in a new language and mean something richer and deeper than ever it did before.

Unique—Accurate—Down to Date

Heretofore it has been impossible to get this knowledge in a reliable and accurate shape except from text-books which repel the average busy man or woman. The idea back of **The Library of Valuable Knowledge** is a new and vital one. Becoming absorbed in these volumes, you will find that unconsciously your powers of observation have been quickened and your imagination has been stimulated.

If you will examine "The Story of Electricity," or "The Story of Rapid Transit," for example, you will find that the books have been brought down to date. At the same time, there is no "Sunday newspaper" science here—nothing that has not passed under the eye of an expert and received the stamp of his approval.

"I have not time to go into detail, but suffice it to say that I am so pleased with them that I felt I would be doing you and some more of my thinking friends a great service to let them know about this set, which I think is the finest of its kind that I have ever seen. Those that love nature can scarcely lay one of these books down when once they have begun to read it."

*From a letter to a personal friend of
E. S. CLEM, Instructor in Chemistry,
Fairmont (Minn.) High Schools.*

Special Introductory Offer In order to introduce this set of books among people interested in these matters and to promote its sale to them and their friends, we are offering to send the 25 volumes at our own expense for your examination and approval. If they are satisfactory, you may keep them and send us the special, low introductory price in small monthly payments. If they are not, notify us and we shall arrange for their return at no expense whatever to you. Read, fill out, and forward the coupon today, but send no money with it.

THE UNIVERSITY SOCIETY 44-60 E. 23d Street
NEW YORK

25 PROFITABLE FACT-STORIES 25

1. The Story of the Stars
2. The Story of the Solar System
3. The Story of the Eclipses
4. The Story of the Earth
5. The Story of the Earth's Atmosphere
6. The Story of Germ Life
7. The Story of the Plants
8. The Story of Life in the Seas
9. The Story of Animal Life
10. The Story of the Living Machine
11. The Story of a Piece of Coal
12. The Story of a Grain of Wheat
13. The Story of the Cotton Plant
14. The Story of Primitive Man
15. The Story of Extinct Civilizations of the West
16. The Story of Extinct Civilizations of the East
17. The Story of the Alphabet
18. The Story of Geographical Discovery
19. The Story of the Art of Building
20. The Story of Music
21. The Story of Books
22. The Story of Photography
23. The Story of Electricity
24. The Story of Rapid Transit
25. The Story of the Mind

Bound in rich half-leather, dark blue leather backs and linen buckram sides, head-bands and gold backs. Every detail of manufacture will suit the most exacting. Each volume (7½ x 5¼) has a complete index.

A mere glance at the authors named below will suffice to convince you of the wealth of learning at your service.

Geo. F. Chambers, F.R.A.S.; Prof. H. G. Seeley, F.R.S.; Douglas Archibald, F.R.M.S.; Prof. H. W. Conn; Grant Allen; Prof. S. J. Hickson; B. Lindsay; Edw. A. Martin, F.C.S.; Hon. W. C. Edgar; Frederick Wilkinson, F.C.S.; Edward Clodd, F.L.S.; Robert Anderson, M.A., F.A.S.; Jos. Jacobs; P. L. Waterhouse, R.I.B.A.; F. J. Crowest; G. B. Rawlings; A. T. Story; John Munro, C.E.; Beckles Wilson; Jas. M. Baldwin, P.L.D., LL.D., Dr. Sc. With introduction by William T. Harris, A.M., LL.D., late U. S. Commissioner of Education, Washington, D. C.

COUPON

CUT THIS COUPON OFF AND MAIL TODAY

The University Society
44-60 E. 23d St., New York

Please send me on APPROVAL, charges prepaid, a set of THE LIBRARY OF VALUABLE KNOWLEDGE, twenty-five beautiful volumes bound in half-leather. If satisfactory, I agree to pay you \$1 promptly and \$2 a month thereafter for eleven months. If not satisfactory, I will notify you. P.M.-4-11

NAME

STREET

CITY AND STATE



Shop Notes for 1911

Vol. VII of the Series—Just Published—Price 50c Postpaid

THE Series of Shop Notes Year Books now comprises seven volumes and constitutes a *Mechanics Encyclopedia* of unequalled value. The low price of 50 cents a volume or \$3.50 for the complete set places them within the reach of all and no one who uses tools should do without them. The investment of but \$3.50 places at the disposal of every tradesman over

4000 Easy Ways To Do Hard Things

some of which daily confront him. These books are "*Written So You Can Understand Them*," and cover every department of mechanics. They represent the "boiled down" experience of expert engineers, firemen, carpenters, machinists, plumbers, painters, iron and wood workers, electricians, masons and other tradesmen.

☛ The addition of a new volume each year affords the purchaser of a set an opportunity of keeping abreast with the newest and best developments, as each volume contains matter entirely different from the others and of a strictly up-to-date nature.

200 Pages	Vol. I,	"Shop Notes for 1905"	385 Illustrations
228 Pages	Vol. II,	"Shop Notes for 1906"	555 Illustrations
228 Pages	Vol. III,	"Shop Notes for 1907"	580 Illustrations
212 Pages	Vol. IV,	"Shop Notes for 1908"	536 Illustrations
224 Pages	Vol. V,	"Shop Notes for 1909"	461 Illustrations
224 Pages	Vol. VI,	"Shop Notes for 1910"	451 Illustrations
224 Pages	Vol. VII,	"Shop Notes for 1911"	468 Illustrations

Sold singly at 50 cents a volume postpaid, or the complete set of seven volumes may be had in a handsome case at \$3.50 prepaid.

Popular Mechanics Co., Publishers

225 Washington Street

CHICAGO, ILLINOIS

Books for Young and Old Who Like to Make Things

Amateur Mechanics No. 1— 174 Articles
165 Illustrations

Amateur Mechanics No. 2— 193 Articles
196 Illustrations

Mechanics for Young America— 150 Articles
196 Illustrations

These books tell how to make hundreds of different articles of daily use and the directions are "*Written So You Can Understand It.*"

Instructions are given for making such things as Workbench—Wireless Telegraph Outfit—Boats of Various Kinds—Induction Motor—Lantern Slides—Arc Lamp—Motorcycle—Devices for Winter Sports—Electric Locomotive—Aerial Glider—Flash Lamp—Static Electric Machine—Ice Boat—Steam Engine—Bobsled—Induction Coils—Lathe, etc.

Price 25 cents each, postpaid

For sale by all newsdealers or can be ordered direct from the publishers

Popular Mechanics Book Dept.

225 WASHINGTON ST.
CHICAGO

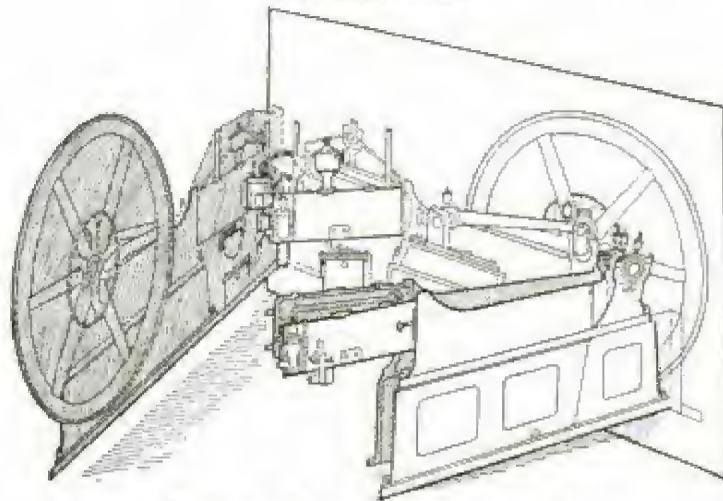
50c
Each**ENTIRELY NEW**
IN THIS COUNTRY**50c**
Each

Separable-Parts Models

of Steam Engine, Wireless Telegraph, Motor Car, Gas Engine, Dynamo, Steam Turbine

Size 8x14 inches

Price
50c
Each
Postpaid



Complete Set
of
6 Models
\$2.50
Postpaid

Illustration shows how parts separate

THESE models are of great value as a means of graphically showing *all* the interrelated parts of the above named mechanisms by virtue of their construction, which is similar to that of educational manikins of the human body and organs, with which nearly everyone is familiar. Beginning with the outermost or surface parts of the gas engine, for example, these are all differently colored and numbered to correspond to a printed key of names which comes with each model. By means of their hinge-like attachment, they may then be lifted, thereby disclosing to view the layer of parts next underneath, exactly as they would be in the engine itself, and so on until the innermost construction is shown.

The models are carefully made by hand in Bavaria, and this is the first time they have been offered in this country. We are the sole representatives in the United States.

As their value to engineers, students and, in fact, everyone having occasion to refer to the construction and working of the different mechanisms mentioned, was at once apparent to us, we felt that they would be highly appreciated here. They are substantially made of heavy paper, and with ordinary care will last indefinitely.

Supply Limited — Order Now

ADDRESS

**Popular Mechanics Book Dept., 225 Washington Street
CHICAGO**

Classified Advertisements

Advertisements in this section, 10 cents per word, each insertion payable in advance. To insure ads. being inserted under proper classified head in the May issue, copy must reach this office not later than April 1st.

February 23, 1911.

Popular Mechanics Magazine, Chicago, Ill.

Gentlemen: For several years past we have used the classified columns of your magazine every issue, and can truthfully say it is the best and most profitable investment we have ever made in classified advertising. We use classified space in a large list of high priced magazines and Sunday newspapers throughout the country, and in checking up results Popular Mechanics not only shows the greatest number of replies, but the volume of business actually derived is so far ahead of its nearest competitors as to throw them into the "also ran class." In our opinion the Popular Mechanics is in a class of its own, and from experience can say that the classified columns of your magazine are as carefully read as the reading matter, and that is what makes your publication the best classified medium in America. With best wishes for the further success of Popular Mechanics, we are,

Very truly yours,

FRED B. RESAG & CO., Chicago.

AUTOMOBILES

AUTOMOBILE INSTRUCTION, four weeks' course covering shop and road work—provision for out-of-town men. Send for booklet P. M. West Side Y. M. C. A. Automobile School, 318 West 55th St., New York City, N. Y.

FORD "1911" TOURING CAR, five-passenger full equipment, as good as new, first \$450 takes it. Write for full particulars. Kling, 2230 7th Ave., N. Y. C.

HOLSMAN MOTOR BUGGY, fine order, \$125. Premier four-cylinder air cooled engine, \$50. 1710 Jenny Lind St., McKeesport, Pa.

MODEL "G" BUICK, 5-passenger, 24 horsepower with full equipment; good running order; forced sale, \$420. Write for photo. Island's Garage, Hickory, N. C.

AUTOMOBILE MODEL. Every part shown and named. You can to all intents and purposes take off the wheels, raise the hood and remove the body; exposing to view the vital parts. The only practical method of studying the automobile. Price 50 cents postpaid. Popular Mechanics Book Dept., Chicago.

AUTOMOBILE WANTED for 177 acres Texas land. Drawer 7, McKinney, Texas.

NEED SOME REPAIR. Make offer. Send for list of bargains, 275, Burlington, Wis.

AUTOMOBILES at very lowest prices. List and catalogue for stamp. Rubel Co., Louisville, Ky.

STEAM CAR OWNERS. Myers Kerosene Burner, something new; write for circular, 729 W. Colfax Ave., Denver, Colo.

WHITE STEAMER WANTED—2 hp. motorcycle or boat engine, and 3 clarionets for sale. Photo. W. Guest, Russellville, Ark.

OLDS RUNABOUT, in excellent running order; good tires, leather top, lamps, etc., \$85. Zoller Bros., Muncie, Ind.

SHAFT DRIVE AUTO COMPLETE, less engine, \$90. 1910 Indian motorcycle, good order, \$150. George Russ, New Philadelphia, Ohio.

ORIENT LIGHT DELIVERY CAR; solid tires, good running order, \$75. Arthur Porter, La Salle, Ill.

FOR SALE—Five-passenger Cadillac automobile, \$200. Olds delivery wagon, \$250. Lawnmower grinder, Cincinnati time clock. Frank Rettig, Wabash, Ind.

KIRLINGER RUNABOUT, with top; like new, \$200. F. Booth, Stanley, N. Y.

OLDS AUTOMOBILE, excellent condition; leather top, good tires, \$85. George Wills, Canal Dover, Ohio.

AUTOMOBILE INSTRUCTION, four weeks' course covering shop and road work—provision for out-of-town men. Send for booklet P. M. West Side Y. M. C. A. Automobile School, 318 West 55th St., New York City, N. Y.

"THE HOW AND WHY of the Automobile."—A 200 page book of practical information for seekers after the fundamental facts regarding the gasoline engine and its application to the motor car. Interesting and instructive to both the beginner and the expert. Bound in full cloth—250 illustrations. Price \$1.00 postpaid. Popular Mechanics Book Dept., 225 Washington St., Chicago.

AUTOMOBILE SUPPLIES

DON'T LET THE MUD ACCUMULATE in your auto radiator; it retards the circulation of water through the coils and water jackets around the cylinders. Makes the cylinders so hot they carbonize the oil; causes back firing, or premature explosions, which breaks crank shafts, causes more friction, more oil, more smoke and higher cost of maintenance. Use the McKnight Radiator Compound; it keeps the water next to the hot surfaces all the time. One package will last the season. It will cost \$5 per package, shipped on receipt of price. Live agents wanted. Address W. J. McKnight, 45 Cayuga St., Buffalo, N. Y.

FOR SALE—40-h. p. new Ross boiler, 26-in. diam. with burner, has copper shell, wire wound; 1,000 copper tubes; cost \$875; sell \$250, check, money order or C. O. D. R. E. Caldwell, Beverly, Mass.

AIR PUMPS. Electric or belt-driven; especially made for garage or private use. Specifications on request. A. M. Gibson, 549 Quincy St., Chicago.

BARGAINS IN AUTO ACCESSORIES. It will pay you to deal with us and save lots of money. Ask for our bargain sheet. Emden & Co., 1303 Michigan Blvd., Chicago.

MULTIPLE JET CARBURETOR for Automobile and Marine engines. Satisfaction guaranteed or your money refunded. Prices: 1½ in. 2 Jet, \$15; 1½ in. 3 Jet, \$20; 1½ in. 4 Jet, \$25. 1½ in. size is a cluster of three carburetors; one set for low speeds, one set for medium speed, and one set for high speed. Simplest, easiest regulated, by far the most powerful, is economical, and uses low grade gasoline. Easiest to start of all makes of carburetors. Liberal discount to agents, dealers, supply houses and garages. Multiple Jet Carburetor Co., Dayton, Ohio.

AUTO CASES, new fresh stock, first quality 28x3, \$10.30; tube, \$2.40. 30x3, \$11.30; tube, \$2.65. 30x3½, \$15.45; tube, \$3.25. 32x3½, \$16.70; tube, \$3.50. 32x4, \$21.45; tube, \$4.00. 34x4, \$23.10; tube, \$4.80. Clincher or Outlap. For other sizes, send for price list. Send 10% with order; examination allowed. W. Vanderpool, Springfield, O. Largest tire dealer in the Central States.

TIRES NEED NOT BE Vulcanized. Kit for repairing punctured inner tubes. Easily, quickly and permanently repaired while on the road by anyone. Price, only \$3 postpaid. Will save hundreds. Guaranteed to be as represented. Booklet for stamp. F. E. Brown, Fitchburg, Mass.

FOUR CYLINDER WATER COOLED MOTORS, \$125, \$150. Photos. Four 32x4 wheels, solid axles, two tires, \$50. Body, frame, springs, \$50. Butts, Oxford, New York.

SPECIAL ELEVEN SEVENTY FIVE OIL, grease, spark plugs, etc. J. L. Badste, 763 34th St., Milwaukee, Wis.

BOOKLET FREE—How to repair auto tire puncture permanently in one minute. A. D. Ames Specialty Co., Box 4, Kirkman, Ia.

GOING TO BUILD AN AUTO? Steam or gasoline? If so, send for list telling us what you need. J. L. Lucas & Son, 3 Fox St., Bridgeport, Conn.

STEAM AUTOMOBILE ENGINES, BOILERS; parts of Prescotts, Locomobiles, Mobiles, Stantons, or other steamers; for sale at reasonable prices. Send for list. State wants. E. L. Marshall, 34 Vernon Ave., Lake View, N. J.

STEAM AUTO BOILERS Bought, Sold and Repaired. J. L. Lucas, No. 2 Fox St., Bridgeport, Conn.

MOTORCYCLES

SECOND-HAND MOTORCYCLES, \$50 up; 1909 Pierce 7, \$160; 1909 Indian, \$75. Every machine guaranteed. Large motorcycle and supply catalogue now ready; send stamp. Rollman Bros., Barrett and Broadway, Louisville, Ky.

'07 THOR, \$45; '09 Thor, \$85; '09 Magneto M. M., \$95; '07 Indian, \$65; '08 Indian, \$75; '09 Indian, \$85; '09 Indian Twin, \$125. Write for our bargain sheet, Howard A. French, Baltimore, Md.

YOU CAN GET a better motorcycle and save money if you get our large illustrated catalogue of ninety motorcycles for your selection. Every machine in stock guaranteed. Prices very low during winter; enclose three cents, stamps. Rubel Co., Louisville, Ky.

MOTORCYCLES, \$50 UP. Indians, Royals, Thors, Harley Davidsons, Excelsors, Wagners, etc.; every one guaranteed; send for bargain list and large motorcycle supply catalogue, repairs, etc. F. B. Widmayer Co., 2312 Broadway, New York City.

ROTARY BICYCLE SIRENS, \$2; motorcycle sizes \$5 and \$6; chain repair tools, \$1. Battery or magneto cut-out switches, 75c. Magneto covers, 75c. Coaster brake bicycles, \$25 up. Send for samples. F. Widmayer, 2312 Broadway, New York City.

YALE MOTORCYCLES SELL. Rider agents, big money demonstrating. Show them, that's all. Anything of value taken as part pay. English Motor Co., New Castle, Pa.

MOTORCYCLES—1911 M. M. TOURING MODEL. Has more actual features than all others. Idle free engine, roller bearings, etc. Agents wanted. M. M. Mfg. Co., Brockton, Mass.

PIERCE FOUR CYLINDER MOTORCYCLES scarcely used and in first class condition; for sale at very low prices. Wm. B. Colburn, 18 Hanover St., Buffalo, N. Y.

FOR SALE—TRIBUNE MOTORCYCLE, 3½ h. p., good condition, \$95. Rev. G. A. Tyler, Wardner, Idaho.

CASH for used motorcycles. Rubel Co., Louisville, Ky.

EXCELSIOR, \$120. Ralph Mount, Marion, Ohio.

1000 Battery Ammeters, 25c. See Fr Sale.

1910 TWIN INDIAN, \$180; fine condition. Ray Ellis, Arkansas City, Kans.

WANTED—Motorcycle. A. Maes, Terre Haute, Ind.

MOTORCYCLE CASES AND TUBES; made by the Morgan & Wright Co. My prices are very interesting. Send for price list. Wm. Vanderpool, largest tire dealer in the Central States, Springfield, Ohio.

INDIAN 3½ HP. MOTORCYCLE; guaranteed good condition, \$125. S. W. Brown, C304, Manhattan, Kans.

FOR SALE—Late 1910 Excelsior motorcycle. A. E. Crispin, Findlay, O.

FOR SALE—1910 2½ Indian; practically new. William Letter, Tiffin, Ohio.

BARGAIN—INDIAN TWIN cylinder motorcycle. Good condition, \$90. A. B. Porter, La Salle, Ill.

ACCOUNT OVER STOCK. We now offer until sold new Dav Colls for single cylinder, \$3.50; double, \$4.00. Hundreds of other bargains in our catalogue. Write to-day. Motorcycle Equipment Co., Hammondport, N. Y.

MOTOR CYCLES—Enormous variety of American and Imported makes—Indians, Marsh's, \$35.00. Hundreds of other bargains. Shipped freight prepaid. Write now. Large illustrated bulletin free. Motorcycle Exchange, 215 West 125th St., New York City.

MOTORCYCLES \$35 UP. All makes. Send today for bargain list. Shaw Mfg. Co., Dept. 30, Galesburg, Kansas.

"CONSTRUCTION, MANAGEMENT & CARE OF Motorcycles," new enlarged fourth edition just off the press. Most complete work on Motorcycles ever published. Detail motor drawings, Two-Speed, etc. Prepaid for 25c stamps or silver. Keller & Risner, St. Paul, Minn.

DON'T BUY A BICYCLE Motor Attachment until you get our catalog and prices. Shaw Mfg. Co., Dept. 27, Galesburg, Kans.

WANTED—Motorcycles of any make. Several Wagners wanted. Give description and lowest price for yours. Shaw Mfg. Co., Dept. 28, Galesburg, Kans.

AERONAUTICS

AEROPLANE MOTORS, ALIGHTING GEARS, ribs, cloth, in fact complete illustrated catalogue of material for building any type of flying machine. We have the largest stock and can make prompter shipments than any aero supply house in America. Also manufacture "Gray Eagle III-planes," 50 horse power, \$2,250, tuition included. Built especially for exhibition use. Aviators can earn \$500 to \$2,000 per day. Enchase 10c in stamps for large catalogue. Hubel Co., Louisville, Ky.

ENGINES FOR SALE at bargain prices: Pierce four cylinder motorcycle engines, force feed oiling, six horse power; 62 pounds with magnets and fly wheel. Very efficient for aeroplane or other miscellaneous uses. The Pierce Cycle Co., Buffalo, N. Y.

BUILD AN AEROPLANE. Send us \$1 and we will mail you blueprints and full directions for building a 3-ft. model Antoinette or 2-ft. Bleriot monoplane, or 3-ft. model Wright biplane. Or blueprints and directions for a 20-ft. Glider. Chicago Aeronautic Supply Co., Room 11, 6030 South Park Ave., Chicago, Ill.

AERONAUTIC DICTIONARY, all terms defined, 10c. Monoplane glider model, 10c. Model making outfits, 15c and 25c. Instructions and blueprints for monoplane and biplane gliders 50c each. Aeronautic booklet, 4c. Held Promoting Co., 817 34th St., Oakland, Cal.

AVIATION DIRECTORY, AVIATORS, AEROPLANE BUILDERS. The directory gives the information you want. Aeroplanes, motors, supplies. Every concern in the industry listed. Classified advertisements printed free. Display rate, \$20 per page, 8½x12, 50c per copy. Aviation Directory, Lawrence, Kan.

WORKING DRAWINGS AND DESCRIPTION. How to make a full size Wright biplane or Santos-Dumont monoplane; 15c each, both for 25c. Hibline, 708 W. Lafayette, Baltimore, Md.

MODEL AEROPLANE SUPPLIES. Send stamp for catalogue. McCutchen Aero Company, 2043 W. Tigua St., Philadelphia, Pa.

AERO SUPPLIES: plain and formed wood; aeroplane and balloon cloth; propellers, motors, books and drawings. Machine built to specifications. First aero supply house in America. Largest stock, lowest prices. Large catalogue 10c. Aeronautic Supply Co., 3932 Olive St., St. Louis.

DETROIT-AERO 1911 Complete power plant, 7-ft. propeller, carburetor, battery ignition. Price, \$350; catalogue free. Guarantee: 170 lbs. minimum standing thrust; 149 lbs. maximum weight; 36 hours delivery. Detroit Aeroplane Co., Detroit, Mich.

LEARN TO FLY. \$1,000,000 in prizes. Greatest new industry. Correspondence course in aviation. Apply immediately. University Extension Bureau, Aviation Dept., Chicago.

BLUE PRINTS and working drawings of Curtiss, Wright, Antoinette and Bleriot model aeroplanes. Price, \$1. Chicago Aeroplane Mfg. Company, Chicago, Ill.

MODEL AEROPLANES guaranteed to fly, 15 styles \$1 to \$6. Special 18 in. model flying 100 feet prepaid for \$1. Satisfaction guaranteed. Write for free catalogue. Aeroflyer Company, Medford, Mass.

FOR SALE—Four cylinder 3x3 aero engine, like new; weight, seventy-five pounds; price, one \$50. Fred Mitchell, Sestalla, Mo.

AERO, the only aeronautic weekly. Six weeks' trial 30c. Aero, 2 S. 9th St., St. Louis.

AERO tells how aeroplanes are built and flown. Every week; \$2 a year. Aero, 2 S. 9th St., St. Louis.

BOY'S BOOK OF MODEL aeroplanes; 308 pages, 50 illustrations. Simple; complete instructions for making and flying all models. Postpaid, \$1.37. Aeroflyer Company, Medford, Mass.

RENTON'S CHICAGO AERO WORKS, 49 Wabash Ave. Aeroplanes; air craft supplies; models, wheels, wood, rubber, propellers. Aviators taught.

MODEL CURTIS type aeroplanes that will fly. \$2. Chicago Aeroplane Mfg. Co., Chicago.

"BOY AVIATORS" SERIES. Six thrilling Airship Books for young Americans. New, exciting, and absorbing. Send for Vol. 1, and you will quickly want the others. Postpaid 50c. At all bookstores. Our immense catalogue free. Hurst & Co., 395 Broadway, New York.

PERFECT LIGHT WOODEN MODEL AEROPLANE propellers 8 inch 50c. Postage 5c; each additional inch 10c. Patterson Merrill, 9621 Charles St., Chicago.

"VEHICLES OF THE AIR," the newest and only up-to-date contribution to the literature of aeronautics, contains large working plans of all successful modern flying machines. This book of 500 pages, 140 half-tone photographs and 130 drawings is the only book published containing every known fact of this interesting subject. Size, 9x5½ inches. Price \$2.50 net, postage 25 cents extra. Popular Mechanics Book Dept., 225 Washington St., Chicago.

STANDARD SET CURTISS ribs, uprights, main beams, \$75; complete set Curtiss Willard type 32x5 ft.; biplane, ribs, uprights, main beams, \$75 to order. Deliveries made in one week from date of order. W. H. Atkin, Stratford, Conn.

WORKING DRAWINGS OF THE "DEMOISELLE," Santos-Dumont's remarkable Monoplane, offered to the public for the first time. The set comprises seven large blue prints, showing every detail of construction, accompanied by a description of how to build. The machine is unencumbered by patent rights, the famous aviator placing his invention at the disposal of the world. Price \$2.00 postpaid. Popular Mechanics Co., 225 Washington St., Chicago, Ill.

BOOKS AND PERIODICALS

3,000 FORMULAS, recipes and money making secrets, 368 page cloth bound volume, 25c prepaid. Catalogue of Practical Books for Skilled Tradesmen and Experimenters free. Clarence Hurdage, Publisher, Syracuse, N. Y.

YACHT AND BOAT BUILDING BOOKS, ship pictures, etc. Send for 80-page illustrated catalogue. The Rudder Publishing Co., 2 Hudson St., New York City.

WEBSTER'S DICTIONARY; newest words, thin paper, large type; morocco, 50,000 words, 1,224 pages; \$1.75 delivered. Satisfaction guaranteed. Dunbar, Rowena St., Boston.

MONEY-MAKING mail order books; circulars furnished. Mutual Exchange, Columbus, Ohio.

BOOKS; any kind you want; catalogue free. Reese Publishing House, Mt. Pleasant, Pa.

WEBSTER'S DICTIONARY, 30,000 words, leather, all sizes, 25c. O. K. Theobald, 1219 Vine St., Cincinnati, Ohio.

"YOUR LATENT FORCES," How to use them; 120 pages, 25c. "Personal Magnetism," 146 pages of valuable advice, insuring success in life, 30c. Catalogues free. August Martens, Popular Publishers, Burlington, Iowa.

PERSONAL MAGNETISM wins, 148 pages, 30c. "Hypnotic Wonders" free. Popular Institutes, 22 Randolph, Chicago.

THE MOST COMPLETE, RELIABLE and useful automobile book ever published is Pratt's Special Automobile Treatise. Written by an automobile engineer who has personally instructed thousands to operate and repair automobiles. He knows your needs and has incorporated them in this book. Price \$1.50; absolute satisfaction guaranteed. Write for free booklet C. The C. H. Pratt Co., Cleveland, Ohio.

THE THEORETICAL AND PRACTICAL Boiler Maker, 310 pages; 65 illustrations. By Samuel Nichols. Price \$2.50. Special offer \$1.50 postpaid. Circular free. J. S. Ogilvie Publishing Co., 571 Rose St., New York. Agents wanted.

CHAUFFEURS \$1 BLUE BOOK, practical questions and answers for license. How to run an automobile; 5x8½, 66 pages, 40 illustrations; timing and wiring diagrams, etc.; to introduce, 50c postpaid; agents wanted. Charles Milward, F., 1546 N. 60th St., Phila., Pa.

GREATEST WORK ON FUTURE LIFE. Swedenborg's "Heaven and Hell." Four hundred pages. Fifteen cents. Pastor Landenberger, Windsor Place, St. Louis, Mo., Department 4.

I. C. S. and A. S. C. text-books bought. Geo. F. Williams, Box 408, New Orleans, La.

LEARN VENTRILOQUISM; 64-page book containing complete instructions, 10c. A. Crosby, Merrimac, Mass.

BEFORE BUYING BOOKS ELSEWHERE get our list. Any book in print. State subject wanted. Aptlers, 322 Royal St., New Orleans, La.

"KEEN KNOWLEDGE," Annual subscription 25c. Palmland, Floral Park, N. Y.

WONDERFUL BOOK ON HYPNOTISM, Personal Magnetism and other Occult sciences sent free to anyone. Send your address today. M. D. Bell, Sta. 67, Jackson, Mich.

"METAL SPINNING" is the name of the only book published on this interesting art. A complete working manual both for those who desire to spin metal as an art recreation and to follow this work as a trade. 80 pages, 23 illustrations. Price, 25 cents postpaid. Popular Mechanics Book Dept., 225 Washington St., Chicago.

GAS FOR POWER is taking the place of steam for reasons of economy. Learn all about this great change by reading our new non-technical book on this subject, written by a first class authority for the practical man. 152 pages, profusely illustrated, cloth binding. Price \$1.00 postpaid. Popular Mechanics Book Dept., 225 Washington St., Chicago.

ENGINEERS' questions and answers for license, by Holman, for twenty-five cents, postpaid. Send stamps. Reilly's Book Store, Philadelphia, Pa.

CAMERAS, PHOTO SUPPLIES, ETC.

PHOTOISMS—A magazine that will appeal. Send 25c for 3 mos. subscription or \$1 for a year and a Wager Exposure Scale free. Photoisms, Advertising Dept., 196 Broadway, N. Y.

66 2-3% DISCOUNT. The \$1 popular book entitled, "The Selection of a Photographic Outfit," sacrificed at 33c; 10c extra for mailing. Order now before supply is exhausted. Willoughby, 814 Broadway, New York City.

GET OUR PHOTO CATALOG FREE. Exposure Meter included, 10c. Rex Bromide, Lincoln Park Station, Chicago.

KODAK FILMS DEVELOPED, 10c per roll, any size. Prompt attention given mail orders. Prints 2¼ x 3¼ to 3¼ x 4¼, 3c; 4 x 5 to 3¼ x 5¼, 4c. J. M. Manning, 1002 Third Ave., New York City.

EDUCATIONAL AND INSTRUCTION

LEARN MECHANICAL DRAFTING in your spare time. Constant demand; big pay; short hours for competent men. Individual instructions by mail. Drafting, Box 122, Allentown, Pa.

MAKE YOURSELF WORTH MORE MONEY. Complete course in Touch Typewriting; 33 lessons, \$15. \$5 a month. Round lessons free at Enlish. Piscataqua School of Touch Typewriting, 29 Tanner St., Portsmouth, N. H.

LEARN TO CARVE beautiful flowers, etc., on cardboard. A money-making home employment. Information free. A. W. Dakin, Syracuse, N. Y.

TOUCH TYPEWRITING EASILY ACQUIRED. So simple a child can learn. A complete home instructor. Write to Mayer & Miller Co., Publishers, 351 Dearborn St., Chicago, Ill.

THE SHORTHAND TYPEWRITER enables you to become a good stenographer in six weeks without learning shorthand. Anderson Shorthand Typewriter Co., 5716 (M) Cedar Ave., Philadelphia, Pa.

ELECTROPLATING. Learn this useful occupation from our 112-page treatise. It is "written so you can understand it" and will enable the humblest beginner to make a start. Price, 25c postpaid. Popular Mechanics Book Dept., Chicago.

LEARN AT HOME. In a few evenings, how to construct, operate and repair automobiles, commercial trucks, flying machines, motorcycles, motor boats, gasoline engines, electric motors. Big demand, with good pay for competent men. Thousands of positions open. Let us help you in place and pay. A postal card will do. Address, Extension Department, The Charles C. Thompson Co., 549 Wabash Avenue, Chicago.

YOU KNOW PERFECTLY WELL that you can get more exact and authoritative information from I. C. S. books than from any other source anywhere. I have them—all courses—cheap. A. S. C. sets, technical books, new and second-hand; encyclopedias, wireless, aeronautics; all subjects. My stock is large, but my prices are not. Write, Geo. F. Williams, Box 408, New Orleans, La.

I CAN MAKE a good penman of you by mail. America's finest penman teaches you. Favorite pen and particulars free. Francis B. Courtney, Box 129, Cedar Rapids, Iowa.

THE BEST CUT AND ENGRAVING Course for 25c; regular price, \$5. Herman Becker, 32 East 7th St., New York.

HOW TO READ Music at Sight. Price 50c postpaid. Evans Co., Dept. C, 42 People's Bank, Wilkesbarre, Pa.

WITHOUT KNOWING SHORTHAND you can write 100 words a minute and increase your income—treble your dispatch of business—save your time. Let me explain to you fully how with my new method. Abbreviated Longhand, any longhand writer can easily become the equal of the average professional stenographer. In a few short evenings—at merely nominal cost. Sample Lesson 20c, and full particulars free. Write to-day. A. B. Weaver, Court Reporter, Dept. C, Buffalo, N. Y.

I TEACH UNTIL PROFICIENT—Logarithms, \$3; Trigonometry, \$5; Latitude, 50c; Longitude, \$2.50; Azimuth, \$2.50; Lunar-distances, \$5. Cpt. C. Nielsen, Wilks, Cal., E. Box 448.

\$200 to \$800 MONTHLY easily made fitting eyeglasses. Short, easy mail course. Diploma. Special reduced tuition fee. Big demand for opticians. Best and easiest money-making business. Quick sales. Tremendous profits. We assist you to start. Write today for free "Booklet 4." Tells how. National Optical College, St. Louis, Mo.

EDUCATION? Learn typewriting. See what I say under "Typewriters." Atchison.

BEST SHORTHAND BOOK for home study. Thousands of successful stenographers learned from it; so can you! Pitman system complete, cloth bound, handy size, finest engraving; specially arranged for self-instruction. Price \$1. Every book contains coupon entitling the purchaser to receive one month's practical instructions by mail. Lessons given by the author, Eldon Moran, our best known American Shorthand Instructor. Students are introduced and correspond with each other. The time to begin is Now. Young pupils succeed well. Book well worth \$1; besides, mail lessons worth \$2 will be received without extra cost. Book and lessons sent immediately on receipt of order. Address Popular Mechanics Book Dept., 225 Washington, St., Chicago.

TEN ORE SPECIMENS—Gold, silver, copper, iron, lead, zinc, tin, nickel, graphite, sulphur. Also mineral booklet, 25c. McLaughlin, Sharpsville, Pa.

TRADE SCHOOLS

GREER COLLEGE OF MOTORING. Aeronautics, and Motor Boat Operation. 15,000 feet of floor space devoted to the Practical Teaching of Automobile Driving and Repairing. Home study courses on the above subjects. Send for our free book—"Motoring." 1457 Wabash Ave., Chicago, Ill.

ELGIN HOROLOGICAL SCHOOL, the oldest and most practical school for watchmakers. Send for catalogue to Elgin Horological School, Elgin, Ill.

WANTED—Men by large Contracting Co., \$20,000.00 contract work going. Can learn automobiles, electricity, plumbing, brick-laying trade in few months. No apprentices or helpers work and no expense. Catalogue free. United Trade School Contracting Co., Los Angeles.

PLUMBING, ELECTRICITY, BRICKLAYING or Mechanical Draughting, taught by expert workmen. Short time and small cost. Positions always open. Catalogue free. Write today. Coyne National Trade Schools, 80 E. Illinois St., Chicago.

AUTOMOBILE SCHOOL. You learn with your hands under the superintendence of the best instructors obtainable at the Chicago School of Motoring. Write for particulars. F. E. Edwards, Inst., Dept. "B," 1813 Michigan Ave., Chicago, Ill.

PICTURES AND POSTCARDS

A SAMPLE LOT containing an assortment of ten gold-embossed postcards for 10c. Send one order and be convinced of the high quality of our cards. Great Eastern Photo Studio, 22 West 90th St., New York, N. Y.

ST. LOUIS, THE MOUND CITY: 100 different colored views, 50c by mail prepaid; 14 samples Easter cards, 10c; Samples Easter novelties, 10c. Arrow Post Card Co., St. Louis, Mo.

PORCELAIN MINIATURE COPIED from any picture. Sepia-tone for \$1. Tinted in water colors, \$2. Size about 2 1/2 x 3 in. oval. Stamp for booklet. Jeffres, 6 E. Lafayette Ave., Baltimore, Md.

DECORATE YOUR "DEN" with "Art Gems." Three bewitching poses 25c, 4 for 50c. One 6 1/2 x 8 1/2 photograph free with every order for six. All real photographs. Money back if not pleased. Art Photo Co., 1404 P. M., Grand Rapids, Mich.

OIL PAINTING. "Goddess" 7x5 feet. Canvas, gilt frame, magnificent painting by R. S. Duncanson 1882; perfect condition. J. B., 402 Gerke Bldg., Cincinnati, Ohio.

50 ASSORTED HIGH-GRADE sample post cards, 20c. P. Fitzgerald, 110 Fulton St., Brooklyn, N. Y.

YOU'LL GET CARDS from everywhere. Membership 10c. Idaho Card Exchange, Dept. K, Box 996, Boise, Idaho.

15 VERY FINE POST CARDS, 10c. Either birthday, best wishes, or Easter cards. German-American Post Card Co., Dept. 50, Burlington, Wis.

REAL PHOTOS pretty girls, latest hits; "art gems," 4 for 25c; larger and better ones, 15c each, 5 for 50c; "Personal Magnetism," 25c; "How to Hypnotize," over 200 pages, \$2. The Curtis Co., 7149 Union Ave., Chicago.

POST CARDS, wholesale, 90c—1,000 up. Catalogue, 20c assorted, 10c. Vern Co., 66 Decatur St., Brooklyn, N. Y.

SEND 20 CENTS for 6 scenes from the Far North, 8x10 in. 1323 First Ave., Seattle, Wash.

IF YOU REALLY WANT to exchange post cards, try our splendid club. Lists circulate in many countries. Membership, 10c. Halcyon Club, Box 138, Erie, Pa.

10 Dainty High Grade birthday postals and my bargain list, 10c. W. Deubener, St. Paul, Minn.

5 HIGH ART PICTURES, Smallest Bible on Earth, all 10c (worth 35c), to introduce catalogue. Simons Art Shop, Sidney, N. Y.

"A YARD OF KIDS." The cutest picture ever! Beautiful, happy, bouncing "kids" in different poses, 25c for one, 50c for three. Big reduction to agents and dealers; no free samples. Miller Co., 36 W. 126th St., N. Y.

JOIN THE CURTIS CORRESPONDENCE CLUB, and receive post cards from members everywhere. Largest in existence, Membership, 10c. C. C. Club, 3935R Tracy Ave., Kansas City, Mo.

TWELVE HANDSOME EASTER POSTALS richly colored; gold embossed, 10c (silver). Bender Co., Olean, N. Y.

20 FOREIGN view cards, 25c. Durso, 181M Worth St., N. Y.

32 COLORED EASTER postcards, 12c. H. Johnson, 625 E. 40th St., Chicago.

FUN! Not a sentence read by others during two years (unsealed). Post Card Corresponding! (Offered Reward!) Original Method. Use any ink. Complete Directions (makes each couple's messages different), \$1. To introduce, 50c gets everything. Verne Michener, 1120H, Main St., Kansas City, Mo.

GAMES AND ENTERTAINMENTS

TRICKS, MAGICAL APPARATUS AND SUPPLIES—Amateurs supplied as well as the great professionals. Easy, interesting and entertaining. Amuse and astonish your friends. 4c stamps, brings our four catalogues: Magical Apparatus, Latest Supplement, Marvelous Card Effects and Trick Novelties and Jokers. Send now. Read & Covert, 817C East 43d St., Chicago, Ill.

LEARN VENTRILOQUISM QUICK! I want representatives everywhere! Big money! Great fun! Success assured. Free interesting booklet tells how. Send stamp. Instructor Bailey, 771 Ighehart, St. Paul, Minn.

MAGIC, magazine of wonder. World's most fascinating periodical. Forty pages filled with sparkling pictures, conjuring tricks and magical entertaining news. \$1 a year; sample copy, 10c. F. T. Singleton, 3625 Thompson Ave., Kansas City, Mo.

MOVING PICTURE MACHINE, 25c prepaid. Turns with crank. Extra pictures 5c. Bunch Mfg. Co., Marshall, Mo.

LEARN VENTRILOQUISM—64-page book containing complete instructions, 10c. A. Crosby, Merrimac, Mass.

THE MAGIC COINER, a mystifying trick, complete for 10c. R. Armstrong, Meyran Ave., Pittsburg, Pa.

MAGIC POCKET TRICK FREE, including catalogue; send 6c stamps. Magic Company, 10-276 West 39th St., New York.

MAGIC TAUGHT BY MAIL—Prospectus, catalog, 10 cents. National Magic School, 1193 Broadway, New York.

THREE GOOD TRICKS, 10 cents. Bamberg, 1193 Broadway, New York.

PLAYS, VAUDEVILLE sketches, Monologues, Dialogues, Speakers, Minstrel Material, Jokes, Recitations, Tableaux, Drills, Musical Pieces, Entertainments for all Occasions, Make Up Goods, Large Catalog free. T. S. Denison & Co., Dept. 11, Chicago.

BUSINESS OPPORTUNITIES

WELDING AND BRAZING REPAIR BUSINESS for broken parts of Automobiles and Machinery in general. An exceptional opportunity is afforded to an intelligent man with slight knowledge of mechanics to start in the above business, ought to have as capital \$500 to make a success of same. Anyone having the above qualifications will learn something to his advantage by writing for fuller particulars to Walter Macleod & Co., Cincinnati, O.

BIG PROFITS. Open a dyeing and cleaning establishment; splendid field, very little capital needed. We teach a successful method by mail. Write for booklet. The Ben-Vonde System, Dept. C., Staunton, Va.

I MADE \$50,000 in five years with a small mail order business; began with \$5. Send for free booklet. Tells how. Heacock, 5074 Lockport, N. Y.

START MONEY-MAKING Mail Order Business at home; conducted in your spare hours. New plans; big profits. Everything furnished. Free booklet tells how. Write quick. W. P. Foote, Box 254, Muskegon, Mich.

MUSHROOMS—NEW PURE TISSUE culture summer spawn. Now is the time, plant this new spawn; produces big crop white mushrooms all summer. Four other varieties winter planting; modern plan forcing plants, mushrooms, early quick crop. Book free. Fresh sample brick, 35c postpaid. We are originators and manufacturers of pure tissue culture mushroom spawn. Order direct from laboratory. Challenge Farm, 6981 Gravois Ave., St. Louis, Mo.

MAKE MORE MONIES. Six Business Secrets (telling how) free. Send postal today and increase your income. "Be. Money Back Store," Baltimore.

CONDUCT A "CANDY KITCHEN." Clear \$20 daily. Small capital required. Send for particulars. Kennon & Co., 148 West Ontario St., Dept. A, Chicago.

TURN YOUR SPARE TIME into money with our live, up-to-the-minute mail order plan; \$5 capital will start. Circulars with your imprint furnished. Profitable for man or woman. Particulars free. Stark Co., Whiting, Ind.

\$25 WEEKLY, PAINTING ENLARGEMENTS. Instructions for preparing solar prints in imitation of canvas; also how to paint in oil and water color. 35c. Eastern Supply, Everett, Mass.

BIG MONEY operating a candy kitchen. Our practical candy course starts you. \$15 course for \$1. Humboldt Publishing Co., 4743 State St., Chicago, Ill.

PLEASANT HOME WORK. \$40 a month earned in spare time. No peddling. Write now. Blye & Co., Dept. 31, Terre Haute, Ind.

FOR SALE OR TRADE, electric light plant in a good growing town, clearing \$125 per month. Cambridge Electric Light Plant, Cambridge, Iowa.

ACTIVE PARTNER WANTED. Would consider royalty or financial support. Patented article sold to dealers. 1 1/2 years' charming success. Profits enormous. No experiments. Address, 115 Smith St., Peoria, Ill.

EARN MORE \$\$\$; SCHEMER MAGAZINE. Alliance, O., shows how; 48 pages newest and best \$-getters every month; copy and catalogue, 800 big winners, only 10c.

GOOD OPENINGS IN COLORADO for garages, jewelers, notion stores, carpenter shops, and many other lines. Information free. State Board of Immigration, 53 State House, Denver, Colo.

8% STOCK IN NOISELESS TYPEWRITER that prints an entire word at one stroke in English letters, and is in daily use for every kind of shorthand work. Anderson Shorthand Typewriter Co., 5716(M) Cedar Ave., Philadelphia, Pa.

BARGAIN PAYING MAIL-ORDER BUSINESS. Successful plan and samples, 30c. Popular Science Institutes, Fairbanks Building, Chicago.

DANDY HOME BUSINESS. Sell your ideas, formulas and knowledge by mail. Some make \$1,000 monthly. Instructive booklet for stamp. Information System, 240, Marietta, Ohio.

HAVE YOU ANYTHING TO ADVERTISE? Our Rate Book tells you all about Advertising Mediums, Rates, Circulation, Closing Dates, etc.; sent for 10c; worth dollars. Folder free. Correspondence invited. Dearborn Advertising Agency, 453 Franklin Bldg., Chicago.

MAIL DEALERS AND ALL interested in the Mail Order Business should send for our booklet of "Leader Advertisements." This book will be the foundation of several fortunes during 1911. Will send copy of "Leader Advertisements" and other valuable information which should save you hundreds of dollars, upon receipt of ten cents. Mail Dealers Supply House, 241 Dearborn St., Chicago.

I MADE OVER \$15,000 in two years in mail-order business. Free booklet tells how. Haynes, Madison, Ky.

FREE—"INVESTING FOR PROFIT" Magazine. Send me your name and I will mail you this magazine absolutely free. Before you invest a dollar anywhere, get this magazine; it is worth \$10 a copy to any man who intends to invest \$5 or more per month. Tells you how \$1,000 can grow to \$22,000; how to judge different classes of investments; the Real Earning Power of your money. This magazine six months free, if you write today. H. L. Barber, Publisher, 419, N. Jackson Bldg., Chicago.

MAKE MIRRORS AT HOME. Big profits with little outlay. One 18x24-in. mirror costs \$2 to \$5. You can silver a glass this size for 20c. Send \$1 in stamps or money order and we will send you explicit directions how to do it; also how to emboss, grind, foil, gold leaf, frost, chip and make imitation stained glass. How to transfer photos on glass, bore holes in glass and cut sky-lights. George L. Patterson & Co., Dept. 3, Brockville, Ky.

START A NEW BUSINESS. The "American" Razor Honing and Safety Blade Sharpening Machine earns \$5 to \$19 a day. We teach you how. No previous experience required. R. Green, 171 Washington St., Chicago.

RAISE GINSENG—\$1 per square foot of ground. \$25,000 on 1/2 A. Grows anywhere; 1/2 city lot a bonanza. 10c brings booklet. Sheboygan Ginseng Gardens, Sheboygan, Wis.

\$100 WILL BUY a clean stock of mail-order goods that will retail for over \$1,000. On account of leaving United States, will sell all for only one hundred dollars. Circulars describing goods free. James Orr, 214 Kasota Bldg., Minneapolis, Minn.

FREE YOURSELF FROM WAGE DRUDGERY! Send 10c at once for 12 valuable ways to start a profitable business of your own. Be independent and make more money. Satisfaction guaranteed or time refunded. "Be. Money Back Store," Baltimore.

MINIATURE RAILROAD outfit; good condition; \$385. Locomotive, ten coaches; carries forty passengers. Money-maker at parks, fairs, etc. W. Robb, Canal Dover, Ohio.

SEND 10c FOR SAMPLE COPY of "The Circulating Journal," 209 M. O. names (all new) in book form free. Circulating Journal, 2411 Seventh Avenue, New York.

\$12 PER WEEK with spare-time Mail Order Business. \$1 starts you; particulars free. Jersey Supply House, Washington, N. J.

BE A HANDCUFF KING; make big money on the stage; all vaudeville circuits pay from \$50 per week up. I teach everything in this line. For particulars address, Box 662, Springfield, Mass.

INDEPENDENCE and fortune quickly attained in the Manufacturing Mail Order Business. I furnish formulas, manufacturing processes and trade secrets in all lines. Sold under a positive guarantee; 18 years' practical experience. Revision and improvement of formulas and processes; reduction of manufacturing cost; utilization of waste materials, etc., a specialty. Booklet, formula list and valuable information free. W. L. Cummings, Ph. D., 127 Standard St., Syracuse, N. Y.

BIG MONEY at amusement places with the device for testing batting strength. Send for catalogue. Wm. Sullivan, Richmond Hill, N. Y.

BE INDEPENDENT. Make "Dustless Dust Cloths" at home. Big profits. No special machinery. Formula and practical working instructions only 50c. Self-Help Bureau, Jackson, Michigan.

SEE advertisement under Agents Eagle Rubber Company.

BUILD A BUSINESS of your own and escape salaried drudgery for life. Learn the Collection Business, Limitless field; little competition. Few opportunities so profitable. Send for "Pointers" today. American Collection Service, 161 State St., Detroit, Mich.

I HAVE AN ARTICLE to manufacture at home that beats them all. 4c brings particulars. P. Benson, Stewartville, Minn.

START A MAIL ORDER BUSINESS of your own. Be your own boss. I made \$25,000 in two years with small capital to start. My booklet "Money Making Opportunities in the Mail Order Business" sent free. Address McKean, Dept. 356, No. 2232 Eighth Ave., New York.

PATENTS PROMPTLY OBTAINED. My free booklet will help you to fortune. Read pages 11 and 12 before applying for patent. Write today. Dean Swift, Washington, D. C.

LEARN THE TRUTH about Mail Order Business before buying "outlets." Important information and particulars for starting free. Mail Order Library, P. M. Tompkinsville, New York City.

WE START YOU in a permanent business with us and furnish everything. We have now easy selling plans and seasoned leaders in the Mail Order line to keep our factories busy. No canvassing. Small capital. You pay us out of the business. Large profits. Spare time only required. Personal assistance. Write today for plans, positive proof and sworn statements. J. M. Pease Mfg. Co., 1017 Pease Bldg., Buffalo, N. Y.

I WILL START YOU earning \$4 daily at home in spare time, silvering mirrors; no capital; send for free instructive booklet, giving plans of operation. G. F. Redmond, Dept. 306, Boston, Mass.

LIVE MEN: If you are making less than \$25 weekly, send your address quick. If you have a horse and buggy or bicycle you can use, all the better. We teach you. You can start right where you live. You owe it to yourself to investigate this opportunity and let us prove that we can better your condition. The Thomas Company, 962 Third St., Dayton, Ohio.

FORM A CORPORATION—Congress Law for D. C. and all States; cheap. Raise money easily; advice free. U. S. Legal Corporation, Washington, D. C. Representing \$1,225,000,000.

START A MIRROR FACTORY. We teach and trust you; 10c brings sample lesson; \$25 daily easily. Hullinger's Mirror School, 2, Francesville, Ind.

HOW TO JUDGE a patent. An "eye opener" for inventors. Sent free. Obed Billman, Cleveland, Ohio.

POSITIVELY BEST RIBBONS, three, \$1.10. See what I say under "Typewriters." Atchison.

WANTED

WANTED—Someone to manufacture Combined Penell Holder and Sharpener. Cut and description on application. J. H. Allen, 413 E. Broadway, Sedalia, Mo.

MANUFACTURERS—CALIFORNIA AGENCIES CO. want quick sellers. 635 1/2 So. Hill St., Los Angeles.

SALE OR EXCHANGE

1908 INDIAN MOTORCYCLE for gasoline engine. English Motor Co., New Castle, Pa.

A 14 TO 16 H. P. Horizontal Steam Engine complete less boiler. E. F. Kuhn, Dunlap, Ill.

FOR SALE—Edison phonograph, double-barrel shotgun, coaster brake bicycle, Kodak and outfit, also plating outfit. Want gasoline engine. Fred J. Kappler, 1140 22d St., Moline, Ill.

AGENTS WANTED

WEAR A STYLISH SUIT! Clothes Make the Man! The man who is admired is the well dressed man whose clothes are fashionable and are 1911 styles. You will be that man in your neighborhood! 1911 styles are just in. Get this suit—the sweetest, classiest, snappiest style we ever created—and better your appearance! This is our idea: We want one man as our representative in your neighborhood. You've got a lot of friends. They wear clothes. It is the easiest thing in the world to get them to order their clothes from you. Prices, \$7.50 and up. Those orders mean a big business that more than doubles your salary, and the work is the easiest, cleanest, nicest occupation in the world. New representatives make \$5 to \$10 a day. You simply take the order and measurements and mail them to us. We make the clothes, ship them on approval to your friend and hand you the profit money. A regular clinch! That's the beauty of being in business for yourself. Sit right down now; write us a postal or a letter for the free outfit to representatives. And you get the sweetest suit of fashionable, tailor-made, all-wool, 1911 clothes ever worn in your neighborhood. If your personal appearance and a big business is worth a postal or a 2-cent stamp to you, then act now—write us today. Address, American Woolen Mills Co., Dept. 468, Chicago.

MEN AND WOMEN—Particularly those employed in shops, factories, large office buildings, etc., wanted to introduce the best Hand Cleaner known among fellow workers; if you are earnest and honest we will trust you for the goods as needed; send names of two good people as references and 10c in stamps to help toward postage and show you mean business, and we will send you a pound can and letter of instructions, telling you how to commence taking orders at once; many are thus making upward of \$25 per month "on the side"; why not you? Quick-Klean Co., 505 Main St., Worcester, Mass.

I WANT A GOOD MAN to act as General Agent and District Manager, and appoint sub-agents for the sale of my Florida land. No experience necessary. I pay the general agent \$50 spot cash on every sale. My terms of \$5 a month for a 10-acre farm (no interest, no taxes) makes it possible to sell nearly everybody. \$200 in gold free every month to my best men. Also one grand prize of \$1,000 in gold coin. No capital required, but man must have a standing in his community and be willing to work. If you think you can fill the bill, send for my "Confidential Circular to General Agents," and "Selling Manual." Both free if you are the first to apply from your locality. E. C. Howe, 28 Hartford Building, Chicago, Ill.

SALESMAN AS LOCAL MANAGER to handle complete line of formaldehyde fumigators, liquid soap, floor oil, liquid wax, disinfectants and sanitary supplies. Goods used by U. S. government, New York Central and Pennsylvania R. R. The Formacone Co., 50 Church St., New York.

AGENTS—Biggest money-maker known. The new Canchester Incandescent Kerosene Lamp revolutionizes old lighting methods. Burns air, not money. Six times brighter than electricity, gas or acetylene at 1-16th cost. Burns with or without mantle. Burns this any lamp. Saves 75% oil. No trimming wicks. Showing means selling. Territory going fast. Write today. Handsome outfit furnished. Canchester Light Co., Dept. P. M. 1, 26 State St., Chicago.

A PERMANENT CONNECTION with big pay awaits one responsible man in your section—following up leads and filling orders for fastest selling vacuum cleaner made. Send postal for special offer today. Hercules Mfg. Co., Rochester, N. Y.

ATTENTION—\$1,000 reward paid any one that fails to merge one pint of milk into one pound of butter in two minutes with our new patent machine, weighs six pounds, sells for \$3. Write for illustrated circulars, credit terms, 25 sworn testimonials and agents' prices. Family Butter Mfg. Co., Indianapolis, Ind.

KEROSENE MANTLE LAMPS. America's largest variety and lowest prices for guaranteed goods. Agents, who know, say our burners and mantles are the best on the market. Guilford Co., Seville, Ohio.

READ THIS. \$5 daily with only \$1 capital. Very new. Costs 10c or less. Sells for \$1. Week's supply carried in pocket. Sample, 2 cents. A. M. Hayes, Medford, Mass.

GERMAN SILVER KEY CHECKS—Steel letters for marking same, key rings, etc.; over 30 styles. Agents wanted. Sample marked with your name and address, and key ring, 15c. Please. Die Maker, Winchester, N. H.

AGENTS—BOTH SEXES—We control a specialty never placed on market before. Not for sale in stores. Particulars free, sample, 15c. LeRoy Specialty Co., 75 Park place, room 52, New York.

GENERAL AGENTS WANTED to sell post cards through our original trust scheme method. No talking required. Big profits. Sample package, 10c. Holmes Novelty Co., Holmes Park, Mo.

WANTED—By New York manufacturer, several energetic sales agent to make market a proposition of merit. An exceptional opportunity for a few men of ability; give reference. Trow Mfg. Co., Dept. 29, 51 Leonard St., New York

KEENEDEGE RAZOR hone; latest discovery; over-honing impossible; all shavers will buy; 100% profit. Sample, 25c. Particulars free. Ideal Mfg. Co., Toledo, O.

AGENTS—Ask what we have good to sell; if we don't demonstrate that we have "winners" we'll "shout." Hood Mfg. Co., Boston.

AGENTS 300% PROFIT; sell perfumes and toilet preparations direct from factory to consumer; catalogue and samples, 25c. C. Holly Manufacturing Company, 8 S. 13th St., St. Louis, Mo.

SELECTED OPPORTUNITIES. Send name and give reference. Reliable Sales Co., Box 768, Buffalo, N. Y.

AGENTS WANTED—\$5 to \$25 per day selling our automobile specialty; send for free particulars today. Mitchell Specialty Co., Houston, Texas.

SALESMEN—\$50 to \$100 a week selling our specialty; all classes of business buy large quantities. Pocket sample; great side line. Witli Volpfaues, Chicago, Ill.

AGENTS make \$5 to \$25 per day easy selling our automobile specialty; particulars free; write today. F. J. Schoen & Co., Pocatontas, Mo.

\$100 MONTHLY and expenses to trustworthy men and women to travel and distribute samples; big manufacturer. Steady work. S. Scheffer, Treas., M. O. 125, Chicago.

100% PROFIT SELLING GORDON Photo Pillow Tops. High grade work. Samples and catalogue free. Luther Gordon Co., 171 Washington St., Chicago.

AGENTS in every city and town; best selling automobile specialty; large demand for goods; success assured; start at once. The Rich Jones Co., Georgetown, Del.

MEN and women agents to handle proposition which sells at sight; two to six in almost every home. Particulars free. C. F. Orbin, Kavana, Kan.

AGENTS—DUSTLESS DUST CLOTHS sell on sight. Every housewife wants one. 100% profit. Sample, 25c. Write for full information and free catalogue. Address, Floor Clean Co., 1143 W. 37th St., Chicago.

AGENTS; 100% profit. New patentedawl. Sews harness, shoes, grain bags, anything. Sample free to workers. A. Mathews, 1262 Third St., Dayton, Ohio.

THE NOEL KEROSENE MANTLE LAMP burns electricity, gas or gasoline. The most economical light to burn. A whitewind seller. Customers delighted. Agents write for territory. John S. Noel Co., 10th St., Grand Rapids, Mich.

YOU CAN MAKE BIG MONEY selling Portable Fence right. Every farmer needs it. Write B. Stambaugh, Woodboro, Md., for particulars.

WANTED—AGENTS everywhere to sell our Automobile Specialties; \$5 to \$25 daily; particulars free. Write today. The Warren Supply Co., Box 50A, Station N, New York.

AGENTS sell new patented rake attachment to lawn owners. Sample, 50c. Kummer, Box 23, Minneapolis, Minn.

AGENTS—LADIES, GIRLS, MEN, BOYS. Big profit. Sell and advertise toilet specialties. For particulars, Dr. Michaels, Marinette, Wis.

SMALLEST ALARM CLOCK and Bible in world, 10c each, prepaid. W. H. Garner, A. 110 South Lafayette St., Evansville, Ind.

AGENTS, sell our electrocure; something new, great seller, good profit. Good for rheumatism, etc. The Edgar Mfg. Co., 104-E-2 Hanover St., Boston, Mass.

WANTED—AGENTS, advertisers, mail order dealers, salesmen, showmen, crowd workers, to send us their name and address and receive free particulars of over 50 different plans to make money. Address, Stark Co., Whiting, Ind.

ONE MILLION AGENTS WANTED; fast seller costing 5c, selling 50c. Every firm needs. Orders to \$50. Postal brings samples. Embossed Co., 2437 Milwaukee Ave., Chicago.

AGENTS WANTED—Rubber stamps and novelties. Send 1c for full particulars. A. S. Mankin & Co., Alexandria, Va.

SEND FOR AGENT'S OUTFIT and \$10 watch. No money required. Ogden Jewelry Co., Dept. 95, Chicago.

\$25 WEEKLY and expenses to men and women to collect names, distribute samples and advertise. Steady work. C. H. Emery, M. J. 25, Chicago, Ill.

AGENTS WANTED to sell our beautiful scripture wall motions. Frank Shilling Co., Navarre, Ohio.

SEND YOUR ADDRESS, and we will mail you our catalogue of 750 quick sellers. Over 2,500 guaranteed articles beautifully illustrated in our 4 free catalogues. \$500 prize contest this month. A. W. Holmes & Company, 151 Broad Street, Providence, Rhode Island.

GET WISE. REPRESENT the manufacturer direct. Modern self-heating irons, safety iron stands, etc. Sell on sight. 100% profit. Each so 10c for sample lock. Write catalogue "P." Modern Specialties Mfg. Co., Milwaukee, Wis.

COLLECT NAMES, information, etc., for business concerns. Steady, profitable home business. Instructive booklet for stamp. Information System, 241, Marietta, Ohio.

AGENTS—Improved specialty for automobile owners; quick seller, big profits; illustrated booklets; write today. River Supply Co., Coldwater, Mich. Desk 1.

GET OUR AGENTS' PRICES; calling cards; flashlights; household necessities. Laritz, 1947 Orchard, Chicago.

AGENTS—To sell the "Gem" pocket rule holder in every shop; new invention; just out; sell on sight. New Invention Co., Box 1008, Wilmetting, Pa.

\$10 PER DAY—Legitimate substitute slot machine; sells like wildfire. \$1 sample free; secure territory now. Sidney Game Co., Sidney, N. Y.

AGENTS WANTED—New system bookkeeping. Sample, 40c postpaid. Order today. G. S. Taylor, Jamestown, N. J.

BE AGENT FOR US in your shop, factory or mill. Globe safety razor and 6 blades, retails 50c. Money back guarantee; profit 100%; sample, 30c. Big cutlery catalogue sent free to you with terms and special proposition. Write today. Millgot Sales Co., 800 National Union Bldg., Toledo, O.

AGENTS—You can make \$10 a day selling our new high grade original Air Brush Design Show Cards to storekeepers; 350 varieties. Catalogue free; sample, 10c. People's Show Card Concern, 711 W. Madison St., Chicago, Ill.

MORE MONEY! Lots of money! Agents! And general Agents! Quickest selling 25c article with beautiful premium. Unique selling plan which pulls orders. Send 10c for sample; handsome premium, circulars, prices, etc. Litholla Pm. Co., 1133 Broadway, N. Y.

GET A NOBBY EASTER SUIT. All of your friends wear clothing; why not make them buy their suits from you? You can save money for them and double your income. Don't say you can't. Send us an order for a suit for yourself. Wear the suit—that is all you have to do. You will be surprised how easy it is to take orders when you prove to your friends that you can furnish them with clothing "made to measure" for less money than they are now paying for ready made, out-of-date clothing. They must buy from you in order to get our exclusive styles, weaves and fabrics—the swiftest, finest suits ever made. Take two or three orders and your profit will pay for your own suit. Easy to take measures with our instructions. We furnish a portfolio containing 40 handsome samples and show 30 different styles of coats, and all necessary stationery and information that will start you at once in a profitable, pleasant business. We guarantee to give you a perfect fit. You run no risk. We ship on approval, subject to 24 hours' examination. Your customers must be satisfied with style, fit and quality before paying. And don't forget—we pay the express on everything. Send us your application today if you want to represent us. Don't delay or someone else will take advantage of this great opportunity. Write today—a postal card will do. Paragon Tailoring Company, Dept. 11, Chicago.

ONE ALADDIN MANTLE LAMP AGENT made \$700 in 60 days. Another sold \$50 on money-back guarantee and not one was returned. Burns kerosene (coal oil). Brighter than electricity. Sell themselves on over-night trial. Improved 1911 line is finest in world for homes, offices, public places. Guaranteed. Ask nearest office for proposition. Mantle Lamp Co., Desk 367, Chicago, Portland, Ore., Waterbury, Conn., Montreal, Winnipeg, Can.

OUR STARTLING NEW INVENTIONS. Saxonia Spark Gas Lighter; cheaper than matches; Vacuum Cleaner, cheaper than brooms; Incandescent Kerosene Mantle Lamps, cheapest and best light known. Quick sales and large profits. U. S. A. Lighting Co., Box G, Springfield, Mass.

AN ADDING MACHINE costs \$300. Just think—we will mail a sample of our Lightning Multiplier, with special terms to agents for 10c. Simplicity Co., 420 Ashton, Grand Rapids, Mich.

SALESMEN—Making small towns—Just what you want for pocket side line. Consigned goods, new, snappy, catchy; good profits, prompt commissions and quick shipments; write for order book today. Canfield Mfg. Co., 208 Sigel St., Chicago.

SMALLEST BIBLE ON EARTH; Illustrated; size of a postage stamp. Fast seller. Agents wanted; sample 10c. Ideal Book Co., 719 5th Ave., Grand Rapids, Mich.

AGENTS, BOTH SEX, TO SELL comfort shoes. Good profits. Ideal Shoe Co., Boston, Mass.

BOKARA DIAMONDS—Agents, everyone to wear and sell our famous Bokara diamonds. Write for sample offer and catalogue free. Northwestern Jewelry Co., 52 Northwestern Bldg., Chicago.

AGENTS easily make \$25 to \$100 per week with Greatest Labor Saving Invention. If you are out for the money, send time for three samples, wholesale prices, and unique selling plan which is a winner and money getter. Eagle Rubber Company, 213 East Tenth Street, New York.

WANTED—AGENTS—7 CENTS PROFIT EACH 10c sale; best little article ever offered; sample for 3c in stamps. Rawlings, Box 945, St. Louis.

DON'T ENVY THE MAN who earns big money. Here is your opportunity for all or spare time. Send 25c for sample and particulars. Leary & Munro, 1219 Fillmore, San Francisco, Calif.

AGENTS—Over 500% profit. Gold sign letters; sell everywhere; sample free. Johnston Co., Quincy, Ill.

AGENTS WANTED for "Sander" Vacuum Cleaner. Works like a carpet sweeper. Revolving wheels does the pumping. Powerful. Catalogue free. Fred. Sander, Malden, Mass.

SIDE LINE SALESMEN to sell high class article to Banks and Merchants as advertising souvenirs. Good men make \$50 weekly in commission. Territory open. Sample free. C. Repp & Sons, 557 Lakeside Building, Chicago, Ill.

BULLY! GREAT! IMMENSE! That's what all our agents say after selling our attractive 1911 combination packages of soap and toilet articles with valuable premiums. 100% to 500% profit. One Michigan agent made \$65 in 47 hours; another \$21 in 8 hours; another \$23.50 in 10 hours. Act now—not tomorrow. Davis Soap Works, 264 Davis Bldg., 1420 Carroll Ave., Chicago.

AGENTS make big money selling our new gold letters for office windows, store fronts and glass signs. Any one can put them on. Write today for free sample and full particulars. Metallic Sign Letter Co., 406 N. Clark St., Chicago.

DO BIG SPRING and summer business selling new and winning invention. Over 250,000 sold during 1910; 50,000 first two months 1911. Nationally advertised—a necessity in every home. Preston Hurnon writes: "Secured 110 orders first week." Quick sales, large profits, exclusive territory; attractive samples furnished; credit given. The Progress Company, 911, 210 Monroe St., Chicago.

PICTURE AGENTS—Portraits 25c, frames 14c, pillowtops 35c. Photographic china plates 65c. Our new "Negro Angel" and Jack Johnson pictures get the coin. Samples and catalogues free. Berlin Art Association, Dept. 76, Chicago.

AGENTS WANTED—To sell rich looking imported 30x68 rugs at \$1 each. R. H. Carter, Milan, Tenn., sold 115 in 4 days; his profit, \$51. You can do as well. Write for sample offer and unique selling plan; exclusive territory. A. Condon, Rug Importer, Stonington, Maine.

AGENTS—NEW INVENTION. Revolving rubber heels—Anyone can put on instantly. Heels never run over—never slip—half the price—three times the wear of any other. Sell for 25c pair; 200% profit. Sell like wildfire—every one wants them. Lambert Rubber Co., 1270 Washington Blvd., Chicago.

\$\$\$ SPARE TIME \$\$\$ Earn \$10.00 to \$15.00 a week during spare time. You can do it. Start a Mail Order Business right from your own home, city, town or rural district. We, as manufacturers, have new easy selling plans for you as our Mail Order Dealer to co-operate with us and keep our factories busy. We carry the stock, reasonable leaders, no canvassing. Small Capital. You pay us out of the business. Large profits. Experience not necessary. Do not work and slave for others, helping them to build fortunes but get wise, make it yourself. We show you how. Write me today for Free Plans, positive proof and sworn statement. J. M. Pease, Pres., J. M. Pease Mfg. Company, Dept. A, Pease Bldg., Buffalo, N. Y.

YOU CAN MAKE \$\$\$ as our general or local agent. Household necessity; saves 80 per cent; permanent business; exclusive territory; salary or commission; free sample; credit. J. Pitkin, Newark, N. Y.

AGENTS—Improved specialty for automobile owners; quick seller; big profits; illustrated booklets free; write today. The Chaddock Specialty Co., Box 388, Polo, Ill.

AGENTS: Send for free booklet, inside information on the agency business. Filled with money making plans. Pointers and experience of thousands of successful agents. Address: J. M. Finch, 1162 3rd St., Dayton, Ohio.

AGENTS earn \$25 to \$50 weekly selling our latest styles beautiful braided waists, and dresses, Mexican drawn work, petticoats, various embroideries. Catalogue free. National Imp. Co., Desk 27, 699 Bway, N. Y.

FREE GOLD SAMPLE goes with first letter. Something entirely new. Every firm wants it. Orders \$1.00 to \$100.00. Nice pleasant business. Write today. Metallic Mfg. Co., 406 N. Clark, Chicago.

ACTIVE MEN OR WOMEN to work individually or organize and direct selling crews on patented gas cooking appliance. Saves fifty per cent. Exclusive territory and 100% profit. A. F. Decker, Sales Manager, 37 E. 28th St., N. Y.

AGENTS—\$1.00 hourly. One handed flour sifter. Just patented. Only one in the world. Sample free to workers. Ebricht Mfg. Co., B 367, Columbus, Ohio.

AGENTS—Sell the Pinless Clothes Line. A labor-saving invention; sells on sight; write quick; exclusive territory; \$25 to \$75 weekly; freight prepaid; sample 25c. Pinless Clothes Line Co., 558 Lumber Exchange, Portland, Oregon.

BECOME A MANUFACTURER'S AGENT. We manufacture hosiery which outwears 3 of the ordinary kind, replaced free when hole appears. Easy sales; large profits. First reply obtains agency your city. Triplewear Mills, Dept. D, 724 Girard Ave., Philadelphia, Pa.

PATENTS PROMPTLY OBTAINED. My free booklet will help you to fortune. Read pages 11 and 12 before applying for patent. Write today. Dean Swift, Washington, D. C.

USEFULTES So. Stewart, San Jose, Cal.

AGENTS—\$50 weekly; we manufacture the best needle case made; a wonderful seller; 200 to 500 per cent profit; talking unnecessary; our copyrighted "Trust Scheme" Envelopes do the work; general agents can make over \$100 weekly; send 10c for a 25c sample containing 115 needles; particulars free; buy direct from the factory at wholesale. Puty Needle Co., 102 Union Sq., Somerville, Mass.

AGENTS—WE MANUFACTURE GLASS PAPER. Plain glass windows made to look like real stain glass; something new; easily applied; big money maker; two sample sheets of paper, with catalogue in colors and discount sheet, for 10c. S. H. Parrish & Co., 216 S. Clark St., Chicago.

AGENTS—100% profit. Combination monkey-wrench, plumber's pliers, 15 tools combined. Lightning seller. Sample free. Forshoe Company, Box 1335, Dayton, Ohio.

I WILL START YOU earning \$4 daily at home in spare time, silvering mirrors; no capital; send for free instructive booklet, giving plans of operation. G. F. Redmond, Dept. 306, Boston, Mass.

AGENTS—Portraits, 35c; frames, 15c; sheet pictures, 1c; stereoscopes, 25c; views, 1c. 50 days' credit. Samples and Catalog free. Consolidated Portrait, Dept. 1193, 1027 W. Adams St., Chicago.

AGENTS—HANDKERCHIEFS, DRESS GOODS, Carleton made \$8 one afternoon; Mrs. Bosworth made \$25 in 2 days. No experience needed. Free samples. Credit. Freeport Manufacturing Company, 59 Main St., Brooklyn, N. Y.

WIDOWS, Ladies, Men. New. Interesting. Profitable, easy work. Spare time or permanent. Sell our useful specialties. Our original selling plan will double your sales. Particulars and \$2.00 premium offer free. Fair Mfg. Co., HF51, Racine, Wis.

MEDALLIONS SELL AT SIGHT. 300 per cent to 500 per cent profit. Make up your own goods and be independent. "It's easy." Catalog free. Fred Resag Co., 1205 W. Randolph St., Chicago.

AGENTS—\$3 daily selling our Handy Tool, 12 articles in one. Lightning seller. Sample free. Thomas Mfg. Company, 462 Third St., Dayton, Ohio.

AGENTS—Sell our Yankee Self-Wringing Mop and make \$4.00 to \$10.00 daily; we also manufacture 500 other fast sellers; particulars free. Scheff Co., 1637 Wells St., Chicago.

AGENTS—\$1.00 hourly. One handed flour sifter. Just patented. Only one in the world. Sample free. Forshoe Mfg. Co., B, 1535, Dayton, Ohio.

AGENTS—\$75 monthly. Combination Rolling Pin. Nine articles combined. Lightning seller. Sample free. Forshoe Mfg. Co., Box 335, Dayton, Ohio.

HELP WANTED

WANTED—One good man in each town to take orders for made-to-measure clothes. Up-to-date styles, very low prices; orders come easy. High-class permanent business; fine profits; \$5 a day and up. No money or experience needed. We ship on approval, express prepaid, and guarantee perfect fit. Write for free sample outfit and inside price on suit for yourself. Banner Tailoring Co., Dept. 665, Chicago.

IT PAYS TO GO "up in the air." No salary limit for aviators. We teach you to design, build and fly aeroplanes. Special course to out-of-town students. We need competent aviators in our exhibition department. Can place you with exhibitors and manufacturers. Write for booklet, Dept. G, Chicago School of Aviation, Chicago.

\$3,000 to \$10,000 YEARLY in the Real Estate business, without capital; we will teach you the business by mail, appoint you special representative in your locality, of leading real estate company. List with you readily salable properties. Co-operate with and assist you to permanent success; a thorough commercial law course free to representatives. If you are honest and ambitious, our free 62-page book will surely interest you. Address, International Realty Corp., Dept. 1434, Chicago, Ill.

I WOULD LIKE TO hear from hustlers who want to turn their spare time into money. No canvassing, but a straightforward, legitimate mail-order proposition. Send stamp for particulars. J. Eakin, 881 W. Delaware Ave., Buffalo, N. Y.

WANTED—Salesmen, all or part time, selling hardware, paint, oil and mill trades; commission or salary. The Alcatraz Co., Richmond, Va.

MEN WANTED—Age 18-35, for firemen \$100 monthly; and brakemen, \$80, on all railroads. Experience unnecessary; no strike. Positions guaranteed competent men. Promotion. Railroad employing headquarters—over 400 men sent to positions monthly. State age; send stamp. Railway Association, Dept. 89, 227 Monroe St., Brooklyn, N. Y.

BOILER ROOM SPECIALTY. Leading manufacturer wants an exceptionally high grade salesman, capable of selling \$100 specialty to large power plants. Minimum commission \$25 on each sale. Ladd, 885 Niagara St., Buffalo, N. Y.

MEN MAKE MONEY after reading book containing thousand secrets, 25c. Write today. The Barrow Co., 514 23d St., Oakland, Cal.

WANTED—A man or woman to act as our information reporter. All or spare time. No experience necessary. \$50 to \$500 per month. Nothing to sell. Send stamp for particulars. Sales Association, 601 Association Bldg., Indianapolis, Ind.

WANTED—Reliable man or woman in every city to advertise, deliver and collect; steady position; \$20 weekly easily made; experience unnecessary. Dexter Co., 334 Dearborn St., Chicago.

PINLESS CLOTHESLINE AGENTS coin money. Sample prepaid, 25c. 503 Lumber Exchange, Portland, Oregon.

WANTED—COMMISSION SALESMAN calling on offices and factories to sell a line of filing cabinets and work benches. Henry Rowe Mfg. Co., Newargo, Mich.

CASH FOR NAMES, formulas, information and ideas. Steady profitable home business. Big instructive booklet free. Information System, 212, Marietta, Ohio.

WANTED HIGH GRADE MECHANICAL ENGINEER as master mechanic of large manufacturing concern; must understand construction, mechanical and electrical engineering work and in general thoroughly understand and be capable of taking entire charge of this class of work. State fully experience, references, and age. Address, W. K., 223 Washington St., 6th floor, Chicago.

FREE! FREE!—A complete course in Show Card and Sign Writing to those purchasing small assortment of "Litholia," ready to use colors for show card writing and artists' use. Great opportunity to earn big salary, or establish money-making business. Information free. Litholia Pm. Color Co., 1133 Broadway, New York City.

WANTED—DISTRIBUTORS of advertising matter everywhere. Oliver P. Barkley, Mount Pleasant, Pennsylvania.

SEE ADVERTISEMENT under Agents Eagle Rubber Company.

\$100 TO \$150 A MONTH paid to chauffeurs, demonstrators and truck drivers; no experience necessary. Write for free tuition certificate. Sweeney's Automobile School, 1436 Woodland Ave., Kansas City, Mo.

WANTED ONE THOUSAND CHAUFFEURS and repair men. Our demand for automobile engineers exceeds the supply. Calls for men of intelligence and mechanical bent capable of commanding \$100.00 to \$150.00 per month upon graduation. Resident course \$20.00 to \$60.00. Home Correspondence course completed by practical road and shop work at this school, highly successful. Look this up. Auto Schools of America, Dept. T, 1600 Michigan Ave., Chicago.

WANTED—GOOD ABLE-BODIED MEN as Interurban Motor-men, Conductors, \$65 to \$90 per month. New lines under construction. New positions opening up. Experience unnecessary. Enclose stamp for map new traction lines. I. Railway C. I., No. 16, Indianapolis, Ind.

WANTED, AGENTS, MACHINISTS, ATTENTION! Increase salary, new revised Saunders' Hand Book of Practical Mechanics. Best ever ready reference. Thousands in use. Postpaid \$1.00 cloth; \$1.25, \$1.50 leather flap. Big profits. E. H. Saunders, 216 Purchase St., Boston, Mass.

WE START YOU in a permanent business with us and furnish everything. We have new easy selling plans and reasonable leaders in the Mail Order line to keep our factories busy. No canvassing. Small capital. You pay us out of the business. Large profits. Spare time only required. Personal assistance. Write today for plans, positive proof and sworn statements. J. M. Pease Mfg. Co., 1918 Pease Bldg., Buffalo, N. Y.

LIVE MEN IN EACH COMMUNITY to own and operate a business in his home. Profits are \$200 each week. Money comes in every day and all yours. Brand new business. No canvassing. No capital. Particulars free. Frank C. Voorthies, Desk C. R., Omaha, Neb.

I WILL START YOU earning \$4 daily at home in spare time, silvering mirrors; no capital; send for free instructive booklet, giving plans of operation. G. F. Redmond, Dept. 306, Boston, Mass.

EXPERIENCED OR SUCCESSFUL SALESMEN to sell gasoline lighting systems suitable for any place or purpose; attractive proposition. Write for catalogue. Doud Lighting Co., 216 N. Jefferson St., Chicago, Ill. Dept. A.

PLUMBING, ELECTRICITY, BRICKLAYING or Mechanical Draughting, taught by expert workmen. Short time and small cost. Positions always open. Catalogue free. Write today. Coyne National Trade Schools, 80 E. Illinois St., Chicago.

I WILL START YOU in the Mirror Business. Best paying trade of today. Famous French method. \$5 to \$12 daily. Let me prove it. Free particulars. Corey, Dept. 30, Omaha, Neb.

FOR SALE

RIFLE BARGAINS. 50 U. S. government Springfield rifles, \$4 each. Cost \$18.25 each; perfect condition. Wm. Haven, 5243 Chancellor, Philadelphia.

RENEW DRY CELL BATTERIES; cost 1c each. Two guaranteed formulas, 15c each, or both for 25c. L. M. Kachel Co., Dept. B, Whitewater, Wis.

RARE RELICS, all good order: flintlock blunderbuss, \$18; flintlock shotgun, nearly 6 feet, \$15; flintlock pistol, 15 inches, \$6; double-barrel pistol, \$8. J. J. Davenport, Newfoundland, N. J.

1,000 GUARANTEED \$2. Ammeters for testing batteries, 25c postpaid. Stamps taken. Automobile Repair Co., 521-23 W. 144th St., New York.

FOR SALE—Second-hand private exchange telephone switchboard, 125 drops, with 197 wall telephones, all complete, in first-class condition. Reasonable price. Address: Young Men's Christian Association, Jacksonville, Fla.

FOR SALE—ONE EDISON'S Rotary Mimeograph No. 75 complete, with ink and paper; used few times; \$25. One 110-volt, 60-cycle A. C., 4 blades, ceiling fan, \$22.50. Butler's Film Exchange, Russellville, Ark.

GRAY ELECTRO-PLATING OUTFIT; polishing lathe, buffers, tanks, dynamo, etc. B. S. Potter, Evanston, Ill.

SMALL FOUNDRY—Location Montpelier, Ohio; in good condition; will sell on easy terms, or trade for real estate. Albert Kaufman, Montpelier, Ohio.

THREE FAMILY HOUSE and blacksmith shop, stock, tools. Good condition. W. A. Meyer, Long Eddy, N. Y.

PAIR BRUNSWICK BOWLING ALLEYS and equipment, stored; bargain. W. B. Brown, Granville, N. Y.

FOR SALE—"Ideal" lawnmower grinder; Indian motorcycle; tandem; small lathe. H. G. Mix, Yalesville, Conn.

FOR SALE—Gold loote, \$2,500; one to two ounces gold per ton. "Cassatt," Bldg. "E," Idaho Springs, Colo.

NEW CONN CORNET, never used; Washburn mandolin; eggs from high-class Silver Laced Wyandottes. Frank Faba, Jr., Box 630, Dyersville, Iowa.

NAMES—TEXAS GIN and mill men—10,000 only \$19; 6,000 truck and fruit growers, \$5; taxpayers in several counties, 50c per 1,000. Truck Farmer Publishing Co., Dallas, Texas.

MAKE A MORRIS CHAIR from my blueprint, 15c. Mertens, 522 W. 136th St., New York.

80% PREFERRED STOCK, Anderson Shorthand Typewriter Co., 5714 Cedar Ave., Philadelphia, Pa.

MODERN ENGINEERING PRACTICE, ten volumes. Jay Brown, Paris, Mo.

FOR SALE—Roasting oven, 28x2 wheels; brazing blower. D. P. Yost, York, Pa.

REAL BARGAINS—BICYCLES, MOTOR CYCLES, Marine and Stationary Engines, furniture, pianos and musical instruments, typewriters, sewing machines, etc. Write for list. Atlantic Supply Co., Long Branch, N. J.

"TEXTIGUM" TYPEWRITER COVERS, fine, 50c. See what I say under "Typewriters." Atchison.

MANUFACTURING MACHINERY

DIES, MODELS, SPECIAL MACHINERY. Ask for estimate. Box 316, Fulton, Ill.

IRON, BRASS AND ALUMINUM CASTINGS. Metal Specialties. Patterns, Models, Polishing, Plating and Japanning. North Chicago Tool Works, North Chicago, Ill.

BOATS, LAUNCHES AND STEAMBOAT MACHINERY

MODELS—STEAM ENGINES, MOTOR BOATS, dynamos, motors, etc. With our castings, fittings, drawings and instructions any amateur can build one. Send stamp for catalogue. Drawings, 50c. B. A. B. Model & Mfg. Co., Stuger Bldg., New York.

800 MOTOR BOAT PLANS. I can meet your requirements. Send 25c. for preliminary blueprint and catalogue of designs. Carlton Wilby, Naval Architect, 630 Stevens Bldg., Detroit, Mich.

CEMENT

IF YOU WANT the best information on cement and concrete constructions, subscribe for Concrete, leading cement and concrete monthly. Sample copy, 10 cents. Yearly subscription, \$1.00. Concrete, 135 Newberry Bldg., Detroit, Mich.

MACHINERY AND TOOLS FOR SALE

FOR SALE—One 1½ h. p. two-cycle marine engine. One 3 h. p. 4-cycle marine engine with reversible propeller outfit. One 2-cylinder 10 h. p. 4-cycle marine engine; also a full line of stationary engines. State your requirements. Gas Power Engineering Co., Milwaukee, Wis.

FOR SALE—3¼x3½ water-cooled gas engine, including timer and circulating pump complete, \$60. Johnston & Griffin, South Haven, Mich.

4 H. P. MARINE ENGINE, all equipped, \$35; for 30 days only. Write today for catalogue. Climax Electric Works, New Salem, Mass.

5 H. P. ROCKFORD MOTOR complete, with starting box and switch, \$40. Lellog Muntz, 28 Lower Market St., Milton, Pa.

FOR SALE—New 2-cycle 20 h. p. farm auto. or marine engine, \$115. Vodaz, 1108 E. 42d place, Chicago, Ill.

TO RENT—Electric Motors, all sizes. Send for list and rates. Gregory Electric Co., Chicago, Ill.

INTERESTED IN GASOLINE ENGINES? Send 50c for booklet, "How to Run and Install Gasoline Engines," and a year's subscription to Gas Energy, 28 Murray St., New York.

TWO-CYCLE, TWO-CYLINDER 4 in. by 3½ in. marine and automobile gasoline engines, 16 hp., at \$94 complete. Castings and drawings of same for sale. Richards Iron Works, Maudsloe, Wis.

ELECTRIC SOLDERING IRONS. Write for particulars; free trial 30 days. State voltage and class of work; written guarantee with every iron. Nilson-Dillenberg Co., 155 Adams St., Chicago, Ill.

A NEW 16-INCH by 6-foot lathe, never increased; cost \$450; will sell for \$300. R. Plummer, 122 Water St., New York, N. Y.

FULL LINE OF GAS and gasoline engines in both used and new. All sizes in stock for immediate delivery. New line of Hopper-cooled "Chicago" engines at popular prices. High grade outfits only. Colborne Mfg. Co., 410 W. Indiana St., Chicago.

ENGINE CASTINGS, 1½ horse vertical gasoline, air-cooled, \$7. Three horse marine water-cooled, \$9 cash; drawings included; catalogue for stamp. Novelty Manufacturing Co., 835 West Sixth St., Cincinnati, O.

STONE CRUSHERS, CONTRACTORS MACHINERY, Pumps, Air Compressors. R. Plummer, 122 Water St., New York, N. Y.

FOR SALE—One 5 hp. gasoline engine with trucks (Master Workman). A. U. Shepherd, Flemington, N. J.

WOOD WORKING MACHINES of every description. R. Plummer, 122 Water St., New York, N. Y.

PULLEYS, GEARS, SPROCKETS, Shafting Hangers; see page 147. W. A. Jones Foundry & Machine Co., Chicago.

AUTO-MARINE GASOLINE ENGINE, 18 hp. with reverse gear; excellent condition, worth \$400; must go for \$150. Correspondence solicited. Stebbins-Gaynet, Norwalk, Conn.

\$450 ELECTRIC BLUE-Print Machine; vertical; two sides 42x76 in. Make offer, Wallace Company, 1219 Arch Street, Phila.

ELECTRIC MOTOR—3 hp. 2 phase, 550 volts, 133 cycles. Stanley make. W. G. Snyder, 57 State St., North Adams, Mass.

ONE SCREW-CUTTING LATHE, two wood lathes, forge and anvil. H. C. Lauer, 213 4th St., Evansville, Ind.

GASOLINE, GAS, OIL, and steam engines; 5, 7, 10, 15, 25 hp. R. Plummer, 122 Water St., New York, N. Y.

LATHE, SHAPER, DRILL PRESS, punch press, planer and milling machine. R. Plummer, 122 Water St., New York, N. Y.

IRON TURNING LATHE, foot power, \$30; 28 hp. gasoline engine, sell or exchange. Butts, Oxford, New York.

WIRE STITCHER—SUCCESS; foot power; in perfect condition. Will sell at low price. Owen K. Trull Co., Washington, D. C.

FOR SALE—Rebuilt: Throttling, Automatic and Corlies Engines, Boilers, Pumps, Heaters, Machine Tools, Tanks, Saw Mills, and general machinery, at bargain prices. Let us know your wants. The Randle Machinery Co., 1761 Powers St., Cincinnati, Ohio.

FOR SALE—Engine lathe, swings 9½ in., takes 25 in. between centers. Complete with full set change gears to cut all size threads, 3 to 40 in.; price only \$43.50. Address L. F. Grammes & Sons, Allentown, Pa.

FOR SALE—Gasoline Engines, automobiles, marine and stationary, also castings. Second hand ones taken in exchange and for sale. Apply with stamps. B. W. Richardson, R. No. 30, Peoria, Ill.

LATHES—Send for free circular showing bargains on small Screw Cutting Engine Lathes. S. B. Machine Tool Co., Dept. L, South Bend, Ind.

PATTERN-MAKERS!—A book devoted to the principles of pattern and core making and molding. Written by C. H. Wilhard, a practical pattern maker of years experience. This book, just published, treats the subject in a much more simple, direct and effective manner than most books along this line. 224 pages, 312 illustrations. Price \$1.00 postpaid. Popular Mechanics Book Dept., 225 Washington St., Chicago.

LITHOGRAPHIC MODELS—Series of 6 subjects—Wireless Telegraph—Motor Car—Dynamic—Steam Engine—Steam Turbine—Gas Engine—Size 8x14 inches—All the parts of those mechanisms are shown and numbered to correspond to printed keys of names. Price per set of 6—\$2.50 or 50c each postpaid. Popular Mechanics Book Dept., 225 Washington St., Chicago.

MECHANICAL ENGINEERS

HAVE YOU any intricate mechanical problems to solve? If you have, let me solve them for you at a saving of money, time and trouble. Developing inventions to a practical and commercial basis my specialty. Benjamin Brownstein, Mechanical Engineer and Expert Designer, Ellwood City, Pa. Formerly of Trenton, N. J.

PATENTS FOR SALE

FOR SALE—PATENT NO. 976,064; monkey wrench that grips like a pipe wrench and is quickly adjusted to any size nut; also Patent No. 984,134, cheaply manufactured nut-screw, will work any place and cannot slip. Prices reasonable. E. R. Gilbert, 1512 North Grant Ave., Kalamazoo, Pa.

OUTRIGHT OR ROYALTY. Patent No. 975,680; calf weaner; a device that is used by every farmer; strong and durable. Can be made very cheap. Mathias Eide, R2, Clinton, Minn.

FOR SALE—PATENT No. 127,489; safety hat pin guards. Will manufacture cheaply. Write to owner for model. Geo. Reichert, High Bluff, Man., Can.

PATENT SHAFT COUPLER to exchange; what have you? D. Stetair, 207 Pembina, Winnipeg, Man., Can.

SALE OR TRADE FOR LAND—Patent No. 945,737; door opener; new invention; nothing like it; will trade for land. Elmer E. Kuhn, Dunlap, Ill.

FOR SALE—CANADIAN PATENT No. 128,533, issued Oct. 4, 1910, for nut locks for railway joints; can be manufactured at small cost. Address: A. J. Smith, Box 142, Yellowstone Park, Wyo.

FOR SALE—PATENT No. 966,017, dated Sept. 17, 1907. Portable wagon scale; can be attached to any wagon. Manufactured at low cost; sells on sight. Half interest, or all can be bought for cash or good real estate exchange. Only article of the kind patented. U. S. Portable Wagon Scale Mfg. Co., Oklahoma City.

FOR SALE—PATENT No. 907,225; movable headlight device for automobiles; connected with steering gear. It lights the road further ahead around turns, avoids accidents. For copy address, Wilfred Derby, 93 Adams St., Leominster, Mass.

NEW FLYING MACHINE PATENTS for sale. I offer my valuable U. S. patents 859,274, 926,159 and 976,765. If you mean business, write me. J. Holmes Wilson, Carlisle, Pa.

FOR SALE—Patent No. 969,023—a puzzle. Made cheaply; excellent for street sales. Wm. T. Clerk, Station "A," Washington, D. C.

PATENTS

"PATENTS AND PATENT POSSIBILITIES," a 72-page treatise sent free upon request; tells what to invent and where to sell it. Write today. H. S. Hill, 995 McGill Bldg., Washington, D. C.

INVENTORS—We buy ideas, patented or unpatented; make models, patterns, drawings, manufacture patented articles and obtain patents. Box 565, Columbus, Ga.

INVENTORS—Let us sell your patent. We are manufacturers' agents. Write for plan. Atlantic Supply Co., Long Branch, N. J.

PATTERNS. Chattanooga Pattern Works, Chattanooga, Tenn.

WE SELL PATENTS. Established ten years. To buy or having one to sell write Charles A. Scott Co., 1094 Granite Bldg., Rochester, N. Y.

PATENTS—Our advanced methods save you 80% of your money. "How to succeed as an inventor" sent free. Inventors and Restorers Corporation, Philadelphia, Pa.

MODELS made for inventors. Low prices. Howard Merryman, Towson, Md.

"PATENT NON-SENSE," or "How to Judge a Patent." Free. Obed Billman, Cleveland, Ohio.

PATENT ATTORNEYS

WM. J. JACKSON, REGISTERED PATENT ATTORNEY, Land Title Bldg., Philadelphia, Pa. Correspondence invited. Moderate charges; personal attention in all cases.

IMPORTANT NOTICE—Read my page ad on page 122 Advertising Section, of this magazine, relative to patents, trade-marks, etc. Special offers contained in the ad. E. E. Vrooman, Patent Lawyer, Washington, D. C.

PROMPT, RELIABLE AND SKILFUL Patent Attorney. Edward W. Byrn, 627 F St., N. W., Washington, D. C.

PATENTS PROCURED and positively sold if the idea has merit; all countries; satisfied clients by best references; send sketch; book free. H. Samuels, 115 Dearborn St., Chicago.

PATENTS—Books, 100 mechanical movements, perpetual motions, 50 illustrations. Mailed free. F. Dietrich & Co., Patent Lawyers, Washington, D. C.

\$15 FILES YOUR IDEA in patent office, under my "No fee-in-advance" Plan, and you make and sell under "Patent Applied For." Send sketch for free report. Books free. Obed Billman, Main Office, Cleveland, Ohio.

PATENTS—HERBERT JENNER, patent attorney and mechanical expert, 608 F. St., Washington, D. C., established 1883. I make a free examination and report if a patent can be had and exactly what it will cost. Send for circular.

PATENTS THAT PROTECT and pay. Advice and books free. Rates reasonable—Highest references; Best results. Watson E. Coleman, Patent Lawyer, 622 F. St., N. W., Washington, D. C.

C. L. PARKER, Patent Attorney, Ex-examiner U. S. Patent Office, 310 G. St., Washington, D. C. Inventor's handbook "Protecting, Exploiting and Selling Inventions" sent free upon request.

PATENTS PROMPTLY OBTAINED. My free booklet will help you to fortune. Read pages 11 and 12 before applying for patent. Write today. Dean Swift, Washington, D. C.

REAL ESTATE AND FARM LANDS

ADVANTAGES OF OREGON—100-page book gives amount of government land open to homestead in each county in the states of Oregon and Washington, and description of same; gives homestead, desert, timber, stone, coal and mineral laws; two maps of Oregon in colors, 21x28, showing railroad in operation, one showing all proposed railroad and electric lines, including eastern and central Oregon. 20c each, or the three 50c. Map of Washington in colors, 21x28, 20c. Nimmo, Runey & Co., Hamilton Bldg., Portland, Ore.

ALABAMA FERTILE LANDS FOR \$1 per acre annually, for rent in the great Birmingham district, Jefferson county, Alabama. Also lands for sale from \$5 to \$50 per acre. These lands, according to the U. S. soil survey of Jefferson county, Alabama, are well adapted to the growing of vegetables, fruits, forage crops, and cereals. The city of Birmingham alone consumes \$3,000,000 worth of vegetables annually. Fine opportunities for chicken, hog and cattle raising, and dairying. For further information and descriptive literature in English and German, write to S. Hechinger, secretary, Farm Movement Department of the Chamber of Commerce, Birmingham, Alabama.

SACRAMENTO, CALIFORNIA, SUBURBAN small farms; about 20 minutes' ride on electric cars to center of Sacramento; city conveniences combined with country life, good income, low cost of living and small investment; climate delightfully mild; twelve months' growing season and outdoor life; land very fertile; raise nuts, oranges, olives, great variety of other fruits, vegetables, poultry, etc.; Panama canal, Panama Pacific International Exposition, deep waterway and suburban feature will all boost values; absolutely high class; closest investigation courted; prices very low, easy payments; supply limited; excursion rates. Write today to A. C. Roebuck, Investments, Farm Land Dept., 33, 1024N American Trust Bldg., Chicago.

FLORIDA FRUIT AND GARDEN Market Farms at low prices. Net you \$500 to \$1,000 profit per acre each year. Celery, grape fruit, oranges, vegetables of all kinds grow to perfection here. Also Rockport, Texas, farms for sale. Free booklets on request. B. I. Hazard, agent, 430 Front St., Georgetown, S. C.

FOR SALE—200-acre fruit, stock farm and nursery business. Improved Triumph cotton seed. Paper-shell pecan trees, McGlinch Nursery, Terrell, Texas.

FOR SALE—FLORIDA—WRITE ME for descriptions of bargains in good, title perfect, Florida farms; size, price, terms to suit yourself. J. W. Durham, Sanderson, Fla.

NORTH TEXAS—The country that was never boomed. School, telephones, rural routes, artesian water, wheat, corn, alfalfa, fruit. Write for description. Egan Land Co., Denton, Texas.

MONEY-MAKING FARMS throughout 15 states; all improved; one to 1,000 acres, \$10 to \$100 an acre. Stock, tools and crops included with many to settle estates quickly. Mammoth illustrated catalogue "No. 30" free. E. A. Strout, Station 47, W. 34th St., New York City.

POLK COUNTY, FLORIDA, for health, wealth, and prosperity. Openings in citrus groves, farming, trucking, phosphate mining. For general information write Secretary Polk County Board of Trade, Bartow, Fla.

FOR SALE—An improved half-section, Shawnee county land, 1/2 mile railroad station. Betzer Realty & Loan Co., rear Merchants National Bank, New England Bldg., Topeka.

FOR SALE—Three good coal properties fully equipped for business, immediately. Two good timber tracts in fee, near railroad; possession at once. Terms if desired; great opportunity. S. Shaffer, Pineville, Ky.

AGENTS, TEXAS irrigated orange, fig, truck and alfalfa land. Good water. Big profits. Cool summers; sea breeze; no mosquitoes; \$10 payments; no interest; free booklet. Box 35, Gas, Kansas.

FOR SALE—Fruit and stock farms. James Grant, Bentonville, Ark.

HAVE A TIMBER CLAIM in Washington, will sell very reasonable. Mathias Elde, R2, Clinton, Minn.

10 ACRES AND UP. Healthy West Florida truck, fruit and pecan land; \$20, 100 to 1,200 acres farm and stock land. Running water; \$15. Part pay in crops. W. S. Reeve, Pensacola, Fla.

THE INVESTMENT JOURNAL, McKinney, Texas. The Texas magazine of opportunities. Reliable Texas school land information and three months' trial subscription, 10c.

SEND FOR OUR DESCRIPTIVE CATALOGUE of Delaware and Maryland farms free. Dept. L, Ford & Reis, Inc., Wilmington, Del.

FOR SALE—320 acres Michigan land; extra fine. Price \$4,000; easy terms. Circular free. J. E. Merritt, Manistee, Mich.

AGENTS—TEXAS ORANGE, fig, truck and poultry farms; good water; sure crops; good markets; big profits; cool summers; sea breeze; no mosquitoes; \$5 payments; no interest; free booklet. Box 35, Gas, Kansas.

CALIFORNIA—29 ACRES IRRIGATED RANCH, producing vegetables, fruit, hay; small buildings, near railroad, \$1,700. John Blichfeldt, Anderson, Shasta county, Cal.

OIL LAND FOR SALE OR LEASE—About 500 yards of producer's well near Port Caddo, Marion county, Texas. G. W. Brown, Jefferson, Tex.

YOUR HEART'S DESIRE realized at last in one of our orange groves, on monthly payments. Fine, healthful climate, ideal home and guaranteed investment. Our free booklet "I" tells the story. Write for it today. Gulf Coast Development Company, Alcoa, Texas.

GOVERNMENT FARMS FREE—Official 112-page book "Vacant Government Lands" describes every acre in every county in U. S. How secured free. 1911 diagrams and tables. All about irrigated farms. Price 25c postpaid. Webb Pub. Co., Dept. 365, St. Paul, Minn.

GARY, INDIANA, LOTS—I have them, near Broadway, \$10 down, \$5 per month; no interest. W. J. Schroeder, Ridge Road, Gary, Indiana.

BLACKSMITHS

BLACKSMITHS. There is a great demand for good steel workers and at big salaries. Buy Toy's Modern Methods, welding new steels solid and doing all hard jobs easy; forging and tempering all tools to a standard by colored charts. All for \$1. Send for samples free. W. M. Toy, Sidney, Ohio.

DOGS, POULTRY AND LIVE STOCK

BLOODHOUNDS, FOXHOUNDS, NORWEGIAN BEARHOUNDS. Irish wolfhounds, deerhounds. Illustrated catalogue 4c stamp. Rockwood Kennels, Lexington, Ky.

200-EGG INCUBATOR costs only \$3; new method; uses hen and hen heat; agents wanted; free catalog. Natural Hen Incubator Co., Sta. H., Dept. 27, Los Angeles, Cal.

STEEL STAMPS, STENCILS, DIES, ETC.

STAMPS, STENCILS, SEALS, CHECKS, PUNCHES and Dies. Presswork. Dickey-Grabler Co., Cleveland, Ohio.

FOR THE HOME

WONDERFUL DINNER SET OFFER and Six Beautiful Post Cards, 10c. Rivlin Mercantile Co., Dept. F, Cleveland, Ohio.

METAL WORK AND ETCHING—A 26-page handbook for art metal workers telling how to make a great variety of useful and ornamental objects, such as desk sets, arts-crafts jewelry, etc. Price, 25c postpaid. Popular Mechanics Book Dept., Chicago.

BEAUTIFUL ARTS-CRAFTS LAMPS—Anyone can make them out of paper, cardboard and wood. 16 designs. Inexpensive yet artistic. Complete book of instructions. Price 25c postpaid. Popular Mechanics Book Dept., Chicago.

TOILET PREPARATIONS at Bargain Prices. Beautify your skin with Epidermic Cream; keeps skin soft and youthful; 2 oz. jar 50c. Astringent Lotion; whitens and refines the skin, 4 oz. bottle 50c. Hand Lotion; keeps hands soft and white, 4 oz. bottle 35c. Shampoo makes hair soft and fluffy, pint bottle 50c. Hair Tonic; Promotes growth, stops falling hair, 6 oz. bottle 50c. Any of the above sent on receipt of price. Address Mrs. Mary Waugaman, 3025 N. Spaulding Ave., Chicago.

MAGIC CLEANER—Make it yourself, costs only a few cents; removes spots, stains, grease, etc., from garments and furniture. Cannot injure the choicest fabric. Saves dollars. No home will be without it after first trial. Send 10 cents for receipt. Address Mrs. Coventry, 5971 Maple Ave., St. Louis, Mo.

MAKE YOUR OWN MISSION FURNITURE at the minimum of expense. Our 2 books "Mission Furniture, How to Make It," Parts 1 and 2, tell in plain, simple language just how to make 50 different pieces. Full dimensioned working drawings and half tones of finished articles. Price 25 cents each or 50 cents for the two volumes, postpaid. Popular Mechanics Book Dept., 223

FOR MEN

SAFETY RAZOR BLADES RESHARPENED. We return your own blades. Send them today. You pay nothing until you get them back "good as new, some say better." Then, if pleased, pay 30c per dozen and postage. Visit our model shop when in Chicago. We'll show you how the Keenedge Electric Process differs from amateur methods and toy devices. Watch us sterilize and half-test each blade. Send address for our class mailing wrapper. Keenedge Co., 411 Keenedge Bldg., Chicago.

FOR SALE—30,000 pound best leaf tobacco, mail stamps for samples. Anton Warrin, Franklin, Ky.

SAFETY RAZOR BLADES sterilized and sharpened better than new; 2 cents each. Five years' success. Send for blade box and circular. Electro Stropping Co., 134 Shelby St., Detroit, Mich.

MUSIC

ANY SHEET MUSIC you want, no matter where published, we will supply at 15c per copy postpaid. Willis Woodward & Co., 1193 Broadway, New York.

MUSIC FREE—If you are not yet a subscriber, we will send the Music Magazine to you the first year for 10 cents. You thereby obtain the latest and best full-size piano music free every month for one year. The Music Magazine, 1712 East 55th St., Cleveland, Ohio.

IF YOU WANT the latest music and a better assortment for less money than elsewhere, write today for catalog. Simple's Music House, 204 West Ave., Norwalk, Conn.

PIANOS AND MUSICAL INSTRUMENTS

RADIUM-YTE—The greatest known piano polish for finger-marks, scratches; best factories endorse; \$1 bottle 50c. Refund if unsatisfactory. Great agents' proposition. Montana Hospital, 107 N. Montana St., Butte, Mont.

I WANT TO SELL my \$400 piano, used only 3 months. Would take \$200 cash, or small monthly payments from reliable person. Would allow 30 days free trial to party sending me good references. Address, M. W. Sanders Printing Co., 512 Pontiac Bldg., Chicago.

VIOLIN FOR SALE—Sweet-toned Stradivarius. Write Miss Bertha Mardes, Route 5, Rosedale, Kansas.

PRINTING

PRINTING BARGAIN—100 Envelopes and 100 note heads, neatly printed and good quality paper, for \$1. cash with order; 50 calling cards printed, 25c. Address Mail Order Printery, Maiden Rock, Wis.

PRINTING—Introductory Offer, 50 Envelopes and 50 Letter-heads, 50c postpaid. Samples. Patterson Press, Beaver Falls, Pa.

100 ENGRAVED STYLE Visiting Cards 25c. Neat and attractive. Reiter, Box 142-P, Tipppecanoe City, Ohio.

200 PRINTED ENVELOPES and Noteheads \$1, prepaid. Geo. Rawson, Boothwyn, Pa.

250 ENVELOPES and 250 Letterheads, printed from artistic trade cuts, both for \$1.00. Churchside Press, Binghamton, N. Y.

50 FINE QUALITY VISITING CARDS; name and address; fancy type, 25c; 100 business cards, 40c. W. Deubener, St. Paul, Minn.

25 WHITE ENVELOPES printed, 10c; 100, 32c; postpaid, P. Johnson, 625 E. 40th Street, Chicago.

RARE COINS AND STAMPS

\$7.75 PAID FOR RARE DATE 1853 Quarters, \$20.00 for a Half-Dollar. We pay a cash premium on hundreds of coins. Keep all money coined before 1880, and send 10 cents at once for our New Illustrated Coin Value Book; size 4x7. It may mean your fortune. C. F. Clarke Co., Coin Dealers, Dept. 14, Le Roy, N. Y.

14 DIFFERENT foreign coins and illustrated coin book 25c. Arnold, 109 Mathewson, Providence, R. I.

COINS. WE PAY CASH premiums on thousands rare coins, stamps, paper money. Send Ten Cents for large Coin Value Book. You may have Coins we want. National Coin Exch., Gunnison, Colo.

WATERMARK DETECTOR and suggestions to Collectors and Dealers 10c. Beaver Co., Chemawa, Oregon.

STAMPS FREE. 3 different Souvenir (cancell), or 5 different Taxis, free with stamp lists, 50c coupon; details of \$1,000 stamp contest for 2c postage. W. C. Phillips & Co., Glasstonbury, Conn.

STAMPS—100 DIFFERENT 5-CENT coins; 10 different 15c Large U. S. cent, 5c; 10 different broken bank and state notes, 30c. F. L. Toupal Co., Chicago Heights, Ill.

IF YOU HAVE NOT RECEIVED my 50-page selling catalogue, write for it; free; plenty of values. Always ready to buy entire collections. William Hesselein, 674 Elm St., New Haven, Conn.

FREE—8 unused stamps for names, addresses, 3 collectors, 2c postage. Utica Stamp Co., Utica, N. Y.

STAMPS 100 ALL DIFFERENT FREE. Postage 2c. Mention paper. Quaker Stamp Co., Toledo, Ohio.

COLLECTORS—CATALOG FREE! Powell Stamp Co., Storm Lake, Iowa.

TELEGRAPHY

TELEGRAPHY, both Morse and Wireless, taught quickly. Also Station Agency Work, R. R. Dispatcher's and Western Union wires, and complete wireless station in school. Big demand for operators. Living expenses earned. Correspondence courses if desired. Catalogues free. Dodge's Institute, 15th St., Valparaiso, Ind. Est. 1874.

LEARN TELEGRAPHY AT HOME without cost; 2 Instruments, code; full instructions sent prepaid, only 10 cents. Trades Co., Norwalk, Conn.

TELEGRAPHY TAUGHT in the shortest possible time. The Omniograph Automatic Transmitter combined with standard key and sounder. Sends you telegraph messages at any speed just as an expert operator would. Five styles, \$2 up; circular free. Omniograph Mfg. Co., 41 G. Cortlandt St., New York.

TYPEWRITERS

REMINGTON TYPEWRITERS \$12.00. Calligraphs \$6.00, Hammonds, Yost, Denkmars, \$10.00, Smith Premier and Jewetts \$15.00, Olivers, Underwoods, L. C. Smiths and Royals \$25.00. Fifteen days free trial, and one years guarantee, don't purchase until you get our prices. Harlan Typewriter Exchange, Dept. P.M., No. 217 West 125th St., New York City.

GENUINE TYPEWRITER BARGAINS, no matter what make, will quote you lower prices and easiest terms. Write for big bargain list and illustrated catalogue. L. J. Peabody, 204 Minot Building, opposite Postoffice, Boston, Mass.

THE SHORTHAND TYPEWRITER is faster than Shorthand. One stroke prints a word. Six weeks' practice will make you a good stenographer. Anderson Shorthand Typewriter Co., 5714 Cedar ave., Philadelphia, Pa.

TYPEWRITERS of all makes at astonishingly low prices. Edward H. Quinby, Dover, N. H.

GOOD TYPEWRITER CHEAP—Charles R. Adamson, Emporia, Kansas.

REMINGTON TYPEWRITER CHEAP. Perfect condition. Would ship on approval. Frank Paine, Route 5, Rosedale, Kan.

SALVAGE SALE—Our damage only water and settled for by insurance companies, enables us to sell Remingtons, Underwoods, Smiths, Olivers, all others, rebuilt, perfect condition, 1/4 price, sent on approval. Old Reliable (Est. 1881) Consolidated Typewriter Exch., Dept. 4, 245 Broadway, N. Y.

TYPEWRITER RIBBONS—"We sell 'em fast and furious" for 35c, 3 for dollar; carbon paper 1 1/2c sheet. Wallace Company, 1219 Arch Street, Philadelphia.

UNDERWOODS, Remingtons and all other machines, 30 to 50% less than mfgs. prices. We rent them anywhere, and allow six months' rental to apply toward the purchase price. Write for catalogue and net prices. Typewriter Sales Co., 171 Broadway, New York.

I WANT TO CORRESPOND with persons who are about to buy a high-grade typewriter, and object to paying the high prices generally asked by manufacturers and dealers. Any make on approval. Catalogue, bargain list and valuable information sent free. A. E. Atchison, 4127 West 21st St., Chicago.

TYPEWRITERS—Every kind on the market, write today for best bargain you ever secured. Shipped anywhere on approval. \$6.00 up. Fletcher Typewriter Co., 207 N. 7th St., St. Louis, Mo.

WIRELESS

WIRELESS CODES 10c Standard circuits 5c. Formula for wavelength calculation 20c. Two thousand ohm wireless receivers genuine marconi type \$6. Enamel wire 20 per cent. off list. Austin & Secor, 254, E. 14th St., New York.

THE MURDOCK CIRCUIT DETECTOR affords reliable tests of complete or short circuits in tuners, condensers, coils and all wireless circuits. Description in Bulletin No. 8. Write. Wm. J. Murdock Co., 10 Carter St., Chelsea, Mass.

WIRELESS SET. How To Make—96 page book telling how to construct at small cost an outfit suitable for transmitting four or five miles. Price 25 cents, postpaid. Popular Mechanics Book Dept., Chicago.

MISCELLANEOUS

ANYBODY CAN MAKE BEAUTIFUL ORNAMENTS of copper crystals, transparent, never tarnish. 50c for formula. Send stamp for sample. H. H. Stone, 251 E. Granite St., Butte, Mont.

ILLUMINATING PAINT for all kinds of decorating and publicity by night. Equals electricity and costs but a trifle in comparison. Formulas for preparing all colors mailed for 25c. silver. Fred Conner, Hagerman, Idaho.

"HOW TO JUDGE A PATENT" contains the Patent claim of Selden Automobile, Morse Telegraph, and Bell Telephone. Free. Obed Biltman, Hipp Bldg., Cleveland, Ohio.

OPPORTUNITY—Motor boats, castings, fittings and drawings for building. Send stamp for particulars. B. A. B. Model & Mfg. Co., Slager Bldg., New York.

YOUR FORMULAS, RECIPES, CORRESPONDENCE, ETC., are safe if our System of Secret Writing is used. Sample writing and particulars free. Secretary, Box M259, Edinham, Kan.

TRACINGS MADE from pencil drawings. Neat work. Mechanical, structural, or architectural. R. A. Ruege, West Allis, Wis., R. 4, Box 9.

NAU, CLIPPER—CLEANER. Polished steel, never dulls, 20c. J. Bellag, 40 Clinton St., Albany, N. Y.

CORRECT FORMULAS for anything 50c each. The Malulano Company, 1411 Longfellow Avenue, New York.

KEEP PERSONAL ACCOUNTS—Cash Book, Journal, and Ledger with account-titles inserted, and plain instructions sent prepaid for \$2.00. G. H. Bennett, 61 James St., Ostrating, N. Y.

INTERESTED IN OIL? The Oil Mirror—new and better oil paper than you have seen—costs nothing now for three months subscription. Please send your address immediately. Ward-McIntyre Company, 732 Higgins Building, Los Angeles, California.

YOUR AD in over fifty magazines 3 months, 5 cents per word. A. S. Mankin & Co., Alexandria, Va.

300 MONEY MAKING Formulas, 25c. Sorenson Bros., Perth Amboy, N. J.

YOUR NAME ON 12 rubber tip pencils 50c, also a good pocket knife free. W. M. Stuart, Marshall, Mich.

NINE DEGREE COURSE IN HYPNOTISM, Personal Magnetism, sold originally for \$5—with a year's subscription to Wheel of Life, 25c. Life Publishing Co., St. Louis.

IMPROVED MIRROR SILVERING PROCESS. Never spots or clouds. Particulars free. Address The Minter Co., Dept. 14, P. O. Box 696, Little Rock, Ark.

HANDCUFFS, LEGIRONS, NIPPERS, etc., repairs, keys, handcuffs, \$2.50 pair up. Frank Widmayer, 2312 Broadway, New York City.

MAKE CHEWING GUM. Big profit. Send one dollar for full instructions. Zenith Mfg. Co., 56 Fifth Avenue, Chicago.

TATTOOING OUTFITS send stamp for price list. Blatz and May, Buffalo, N. Y.

14 K GOLD POINTED Fountain Pen \$1.00 Postpaid. Thomas & Brown, 113 West Main St., Connellsville, Pa.

POSTSCRIPT STAMPS, LATEST CRAZE, 25c, all different, 10c J. Homer McMan, Cambridge, Ohio.

LATEST RAT-TRAP. Gets them all. No cruelty. Sample, 25c. Zerhey, Sacramento, Penn.

ONE DOLLAR BILL buys one thousand names, typewritten, all sending me twenty-five to fifty cents each. H. G. Dunlap, 255 Main, Dallas, Texas.

FORMULAS—500 choice formulas and selected trade secrets, 35c. Process Company, 816 Oakwood Bldg., Chicago.

TRANSFER PHOTOS TO WATCH CASES, chinaware, sofa pillows, etc. New process. Very profitable. 25c brings full instructions. P. Benson, Stewartville, Minn.

ANYTHING TO TRANSLATE into German, French or Spanish, send to P. Kaufmann, North Tonawanda, New York.

DON'T OVERLOOK THIS—For \$1 we will teach you to transfer photos to china, watch cases, pearl and all metals. Guarantee success. **William Coffman & Son, Warsaw, Ohio.**

MATHEMATICAL FORMULAS—Show at a glance operations to be performed; long rules boiled down to symbols; require little space in note book; easily remembered. Rules of formulas, 50c; any formula, 25c. **C. Boyd, Huntington, Indiana.**

SEE advertisement under Agents Eagle Rubber Company.

50c BRINGS 5 FORMULAS and full instructions for metalizing, mounting and coloring flowers, insects, etc., for jewelry. Easy home work. Big profits. **P. Benson, Stewartville, Minn.**

"THE AD WRITERS' ASSISTANT"—Book containing 350 phrases, headlines, suggestions, interesting opening chapters, each illustrated with appropriate cut, mailed, 25 cents. Cuts supplied. **F. S. Allen, Drexel Building, Philadelphia.**

TRICKS, JOCKERS, PUZZLES, ILLUSIONS—Magie Pocket Trick Free. Illustrated Catalogue included. Send the stamps. **Marie Dent, 110-270 West 34th St., New York.**

BROTHER—Accidentally discovered root will cure tobacco habit. Gladly send particulars. **F. Stokes, Mohawk, Florida.**

"TEXTIGUM" TYPEWRITER COVERS, fine, 50c. See what I say under "Typewriters." **Aitchison.**

ANYBODY CAN MAKE GOOD CUTS with my simple zinc etching process; price, \$1; specimens and particulars for stamp. **T. M. Day, Box M, Windfall, Ind.**

I WILL START YOU earning \$4 daily at home in spare time, silvering mirrors; no capital; send for free instruction booklet, giving plans of operation. **G. F. Redmond, Dept. 306, Boston, Mass.**

MOTION PICTURE MACHINES, Film Views, Magic Lanterns, Slides, and similar Wonders For Sale. Catalogue Free. We also Buy Magic Machines, Films, Slides, etc. **Hartbach & Co., 809 Filbert St., Philadelphia, Pa.**

TOBACCO CAUSES CHRONIC IRRITATION of brain and nerve cells. **Ni-Ko** heals this irritation. You won't want tobacco any more. You will feel so good. Write, today. **King Ni-Ko, 7, Wichita, Kans.**

HOW to get a Hektograph that will make 150 copies in 10 minutes; letter size, \$2.00. Write for circular. **Heyer Duplicator Co., 84 La Salle St., Chicago.**

500 MONEY MAKING FORMULAS and Digest, publishing monthly 100 Money Makers, one year for 25c. Trial 6 months, 10c. Digest, **Grand Rapids, Mich.**

"PATENT SENSE AND NON-SENSE," or "Good and Bad Patents," compared. Free. **Obad Billman, Cleveland, Ohio.**

TOO LATE TO CLASSIFY

POSITIVELY BEST RIBBONS, three, \$1.10. See what I say under "Typewriters." **Aitchison.**

LIVE WIRE SALESMEN, sell our own make brushes for every household use. Write for particulars, territory and the eight advantages of our proposition, 125% profit. **Capitol Brush Co., Hartford, Conn.**

MODEL OF PANAMA CANAL in relief, \$1. Greenback or M. O., payable Crystal. Canal Zone, Panama Souvenir Co., box 165, Colon, R. P.

EWING'S CABINET MAGICAL TRICKS, contains apparatus to perform seven good tricks including the wonderful "Magic Cabinet." 35c postpaid. **Percy Ewing, Decatur, Ill.**

PERFECTION POCKET ADDING MACHINE. Lightning seller. Agents wanted. **Cincinnati Specialty Mfg. Co., Dept. R., Cincinnati, Ohio.**

MAKE HONEY VINEGAR by our process for 5 cents per gallon. Best vinegar produced is from honey. Send your neighbors addresses who use honey and 50 cents for formula. **Lathaw Appliances, Carlisle, Ind.**

HOW TO BECOME A STAGE ELECTRICIAN. Long guarded stage secrets revealed. Only book of its kind ever published. Copyrighted. Profusely illustrated. Non-Technical. A \$5.00 book postpaid for \$1.00. Address **Shubert's Expert Stage Electrician, Denver, Colorado, Government box, 1043.**

100% PROFIT TO YOU. Low priced hand machine makes \$5 to \$6 worth of staple article in universal use for 40c. Only one on the market, never sold before, several of our men make \$50 per day. High-grade general agents can do even better. Only a few openings left. **Chicago Appliance Factories, Dept. A, 21 Quincy St., Chicago.**

WONDERFUL Discovery, just spray your cylinders, put little in gasoline, results—removes all carbon, but not the oil, gives perfect compression, speed, and power; try quart and see. Send \$1.00. **Treubin, 1655 Tiffany St., Bronx, New York City.**

MR. SHAVER—The Active Automatic Strapper, straps double-edge water blades perfectly, both edges at once and minimizes your shaving troubles. \$2 postpaid. Get acquainted. Free Booklet. (Agents wanted.) **King Strapper Sales Co., Cleveland, O.**

AGENTS—Improved specialty for Automobile owners; quick seller; big profits; illustrated booklets. Write today. **S. B. Jordan Specialty Co., Eureka Springs, Ark.**

SAFETY RAZOR USERS, send name and address. I send you something. **Chas. E. Jewell, 17 James St., Auburn, N. Y.**

1908 MITCHELL, 4 cyl., 24hp. Two bodies, accessories. Will sell or exchange for Motorcycle. **J. Voorhees, Sonestown, Pa.**

E. M. F. OWNERS '09, '10. Increase your power and silence your valve action with my valve adjustments. Guaranteed to lock. **E. P. Medd, 558 S. Dir. St., Grand Rapids, Mich.**

BRAND NEW—PASTE SOLDER. Agents Wanted. Big Profits. Sample and formula 25c. **Acme Products Company, 41 Park Row, New York.**

"CACHOO" (It makes people sneeze), a harmless joke. Sample 12c with cat. jokes. Box, 80c. **Ewing's, 120 Thatcher Place, Decatur, Ill.**

FOR SALE—One of the largest Moving Picture and Vaudeville Theaters in Washington, D. C. P. O. Box 270, Washington, D. C. Price \$8500.00.

WANTED—Small cement mixer. **GES., Box 73, Helmetts, N. J.**

FOR SALE—Fine Steam Laundry Outfit, \$1500. Cost new, \$2500. **Norwich Hotel, Columbus, O.**

LEARN TO REPAIR Sewing machines, make big money at home. address **Leroy Brown, 1216 Madison St., Baltimore, Md.**

FRIENDS, have discovered Root will cure tobacco habit. Receipt & particulars 25c etc. **G. Warkley, Nevada, Ohio.**

THEATRICAL WIGS. Catalogue free. **Percy S. Ewing, Decatur, Ill.**



SLIDING FURNITURE SHOES

replacing castors. Save Carpets, Polished Floors. Slide like a flat-iron. Sell quickly on Demonstration

AGENTS WRITE QUICK

FAIR MFG. CO., FM67, 5th St., RACINE, WIS.



AN EXCEPTIONAL OPPORTUNITY

There is an Exceptional Opportunity in the Tailoring Business to Make Money.

You do not invest any money and you do not have to devote your entire time to the business.

YOU CAN MAKE FROM \$5 TO \$10 A DAY

We will give you confidential prices so that you can get a suit for yourself at the wholesale price. We will furnish you with everything and co-operate with you in every way, and you will make the retail profits in your territory. **We pay express charges on all orders.**

Our made to measure clothes are sold at low prices and **Cosmopolitan Clothes are guaranteed to fit.**

Write to-day for line of samples and full information with regard to this money-making proposition. A Postal Card will do. Address

THE COSMOPOLITAN TAILORING COMPANY, Dept. 88, 208-218 Van Buren Street, Chicago.

Time and Its Measurement

By JAMES ARTHUR

Reprinted from Popular Mechanics. So far as known is entirely different from anything previously written on the subject. Mr. Arthur is a great authority along this line, having for years made an extensive study of clocks, watches and time-measuring devices.

Contents: Chapter 1—Historic Outline. 2—Japanese Clocks. 3—Modern Clocks. 4—Astronomical Foundation of Time.

"Written So You Can Understand It"

64 pages. Profusely illustrated. Size 7x10 in. Printed on coated paper with handsome blue cloth covers.

Price \$1.50 Postpaid

Popular Mechanics Co., 225 Washington St., Chicago

FREE UPON REQUEST

OUR

Valuable 96-Page Catalogue

OF THE

Best Mechanical Books

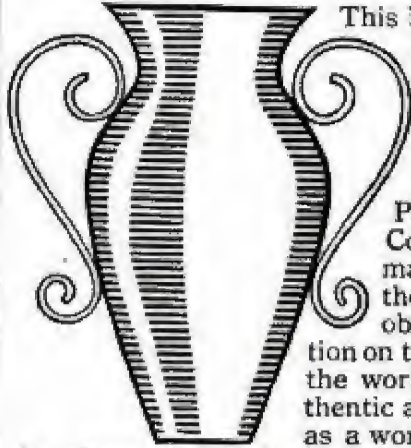
It is well worth having and keeping for reference.

Popular Mechanics Book Dept.

225 Washington Street, Chicago

Practical Instruction In the Fascinating Art of METAL SPINNING

By PROF. F. D. CRAWSHAW
College of Engineering, University of Illinois



This book, the only one published on this interesting art, is one of the series of 25-Cent Industrial Handbooks being published by Popular Mechanics Co. It is written by a man who has made a thorough study of all obtainable information on the subject, making the work absolutely authentic and adapted to use as a working manual both

for those who desire to spin metal as an art recreation and to follow this work as a trade.

80 Pages. 33 illustrations. Cloth cover.

Price 25 Cents, Postpaid

Can be ordered through your newsdealer or direct from the publisher
Popular Mechanics Book Dept., Chicago

WHEN YOU WANT ANYTHING AND DON'T
KNOW WHERE TO FIND IT
WRITE BUREAU OF INFORMATION,
POPULAR MECHANICS CHICAGO

MONTHLY CASH PRIZES

Until further notice in this magazine the Editor of Popular Mechanics will pay two cash prizes each month for the best original contributions to its

SHOP NOTES DEPARTMENT

\$10 for the Best Contribution
\$5 for the Second Best

THIS IS IN ADDITION to our usual rates for such contributed articles.

Quality, not length counts.

Checks will be sent on the last day of each month for the prize articles received during that month. Publication in the magazine will follow in about two months.

PRIZES AWARDED FOR FEBRUARY, 1911

First Prize—CARMI L. KING, Concord, N. H. \$10
"Cutting Arcs on a Metal Planer"

Second Prize—RAYMOND E. CHASE, Melville, R. I. \$5
"Gauge for an Anvil"

EXTRA AWARD

On account of there being four contributions this month, each of which deserved second prize, we have made an EXTRA AWARD of four additional second prizes, as follows:

F. O. ANDERSEN, San Francisco, \$5
"Gauge for Marking Tapering Octagon Poles"

W. R. AYERS, Pittsburg, Pa., \$5
"Repairing a Broken Jaw on a Chuck"

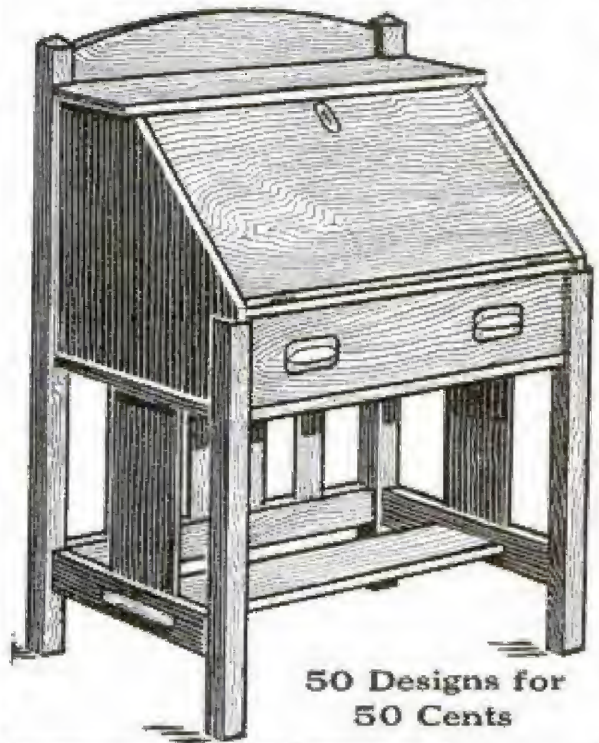
ORLIA A. YOUNG, Louisville, O., \$5
"Tool For Holding Piston Rings While Replacing Piston"

DAVID MAYOR, Providence, R. I., \$5
"Bottle Cleaner"

All accepted contributions to our departments, "SHOP NOTES" and "AMATEUR MECHANICS," are paid for immediately; checks for prize awards are sent at the end of each month.

Address, EDITOR POPULAR MECHANICS
225 Washington St., Chicago

Mission Furniture HOW TO MAKE IT



50 Designs for
50 Cents

Read What One Man Did

*Hattiesburg Miss
Aug 19, 1910*
Popular Mechanics Co.,
225 Washington St Chicago.
Sirs -
Please find enclosed
25¢ for which send me
Part Two Mission Furniture
How to make it, by mail post
paid I have part 1, and have
made one pe. of furniture
and sold \$400.00 Four hundred
dollars worth of it and I am
not a carpenter either but with
the instructions written so I
can understand it I have a business
of my own. Yours truly
John S. Coleman

TWO VOLUMES

PART ONE

21 Designs, 96 Pages.

PART TWO

32 Designs, 128 Pages.

Cloth Cover. **25 Cents Each, Postpaid**

POPULAR MECHANICS BOOK DEPT.

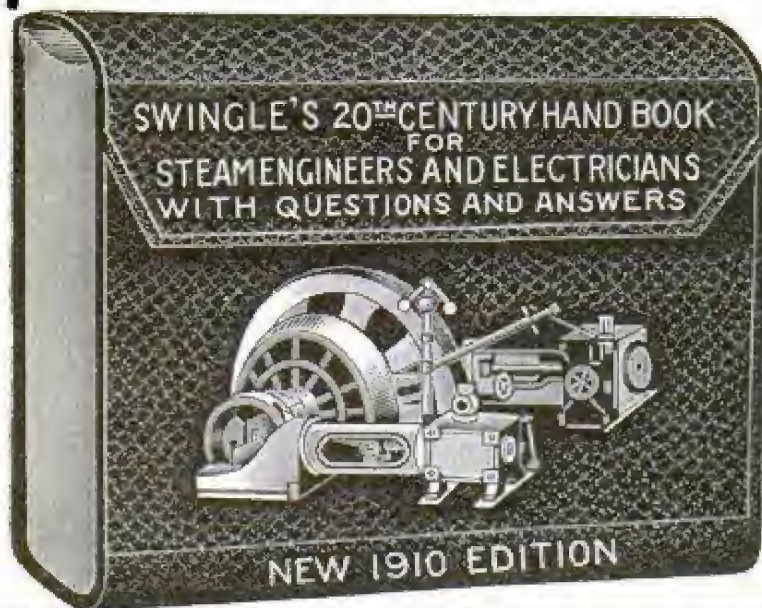
225 Washington Street, CHICAGO

JUST READY

The Twentieth Century Hand Book

For Steam Engineers and Electricians

By CALVIN F. SWINGLE, M. E.



¶ Sixty thousand Engineers and Students have bought Swingle's Hand Book.

¶ WHY? Because it is the best and only practical treatise on Engineering published—and written so plain that even a child can understand it.

¶ This absolutely new edition covers the whole field of Steam and Electrical Engineering in a clear, concise and practical manner.

¶ It is right up to now, and is acknowledged the king of all engineering books.

*New 1910 Edition, Revised and Enlarged.
1500 Pages, 700 Illustrations. Full Leather,
Gold Edges, Pocket Book Style. Price \$3.00*

Sent postpaid to any address upon receipt of price. Your money back if you are not satisfied.

FREDERICK J. DRAKE & CO., Publishers

1327 Michigan Avenue, CHICAGO, U. S. A.

BOOKS

Learn how you can buy books—De Luxe sets or single volumes—for less than cost of paper and binding. Learn why I sell books cheaper and in larger quantities than any other bookseller in the country. A postal brings my Free Lists and the explanation. Get it today.

DAVID B. CLARKSON---The Book Broker
354 Clarkson Bldg. CHICAGO

\$25 to \$100 a Week

Be a live wire. Big salaries paid to our graduate chauffeurs and auto experts. We are an accredited school with competent staff of graduate engineers, and teach you at home in 10 simple lessons to earn big money and assist you to secure a position. Over 100 diagrams included in course. Write for prospectus, sample pages, testimonials from students and employments of 10 leading auto makers—FREE.

Practical Auto School
68 Reister Street New York

Salesmen Wanted

Trained Salesmen earn from \$4,200.00 to \$10,000.00 a year, and expenses. Hundreds of good positions now open. No experience needed to get one of them. We will assist you to secure a position where you can get Practical Experience as a Salesman and earn \$100 a month or more while you are learning. Write to-day for our free book "A Knight of the Grip," list of good openings, and testimonials from hundreds of men recently placed in good positions.

Address nearest office, Dept. 118

National Salesmen's Training Association
Chicago New York Kansas City Seattle New Orleans

**WHEN YOU WANT ANYTHING AND DON'T
KNOW WHERE TO FIND IT
WRITE BUREAU OF INFORMATION,
POPULAR MECHANICS CHICAGO**

Teach Yourself Arithmetic

with a set of ARITHMETIC HELP. Any and all examples and problems in arithmetic, from the easiest to the hardest, are worked out and explained so anyone can understand. For the student or business man. Easy and simple; 2 volumes, 630 pages; over 200 illustrations and color plates; bound in red silk cloth. Most complete ever published. A \$2 bill brings a set prepaid anywhere. Send for a set. If not pleased, return at our expense and get your money back. Order today.

STANDARD SALES CO., 23 Fifth Ave., CHICAGO

WHY BE A ROUSTABOUT

working at uncertain wages, when you can now learn a fine trade in three to five months, and be a high grade mechanic. Independent for life earning \$5 to \$8 a day or running a business of your own.

**Electrical Work, Plumbing, Bricklaying,
Mechanical Drawing, or Painting,
Decorating and Paper Hanging**

taught at the most successful trade institute in the world. No books, but tools and actual working materials in teaching. Individual instruction. Low expenses. Easy terms. Graduates placed. Your success assured. Write today for large illustrated catalog.

LESLIE L. COOKE, President

COYNE NATIONAL TRADE SCHOOLS, 76 East Illinois Street, CHICAGO, ILL.



YOUNG MEN WANTED

For Chauffeurs Automobile
Salesmen, Demonstrators and Repairmen

Earn \$25 to \$50 Weekly
Demand for these trained men can't be supplied. The work is pleasant and instructive, out-of-doors, and the hours short. You can prepare yourself for one of these positions in 10 weeks by a few hours' study each week. We teach you the entire subject by our simple course of instruction by mail. It is very interesting, practical and thoroughly efficient because it's personal. Free model of automobile to every student. Ask our graduates who are earning \$25 weekly or more in positions we obtained for them. **FIRST LESSON IS FREE.**

Write for it today. Let us prove our claims.

Empire Auto. Institute, 468 Empire Bldg.
The Original Automobile School, ROCHESTER, N.Y.
Chauffeurs and competent men furnished owners and garages

LEARN WATCHMAKING AT HOME



You can learn by our modern and original system of instruction every part of the Watchmaker's Trade at home as good or better than at a shop. You can earn money while learning and secure a well paying position or start in business after completing our course of instruction. Good watchmakers are always in demand and earn from \$20 to \$35 per week. For particulars apply to the **WISCONSIN SCHOOL OF WATCHMAKING** Enterprise Bldg., MILWAUKEE, WIS.

LAW Study at Home By Mail

Write today for **Free \$100 offer** and 112 pp. Catg. Tells how we make your home a University. Leading correspondence law course in America. New special text prepared by instructors in 21 resident colleges — Harvard, Stanford, Chicago, Wils., Mich., Ill. and others. Over 10,000 students.

Low cost—easy terms. LaSalle Extension University, Box 1194, Chicago

LEARN WATCHMAKING
refined, profitable labor—Competent men always in demand. We teach it thoroughly in as many months as it formerly took years. Does away with tedious apprenticeship. Money earned while studying. Positions secured. Send for catalog

St. Louis Watchmaking School, St. Louis, Mo.

WHEN YOU WANT ANYTHING AND DON'T KNOW WHERE TO FIND IT—WRITE BUREAU OF INFORMATION, POPULAR MECHANICS, CHICAGO

MUSIC TAUGHT BY MAIL

You can learn by mail in spare moments at your home to play the piano or organ **IN TWENTY EASY LESSONS** by our wonderful Simplex System. No previous knowledge of music necessary. Delighted students in every state. Write for **Free Book** today. State if you have piano or organ.

SIMPLEX SCHOOL OF MUSIC
Conservatory 698 KANSAS CITY MO

THIS FREE BOOK TELLS HOW

UNCLE SAM WANTS YOU



Railway Mail Clerks—Internal Revenue Employees—Custom House Examiners and Clerks—City Carriers—Postoffice Clerks
Over 15,000 positions will be filled during 1911
\$800 to \$1800 a Year for LIFE

No "layoffs" without pay, because of strikes, financial fluctuations or the whims of some petty boss. Excellent opportunities for quick advancement to Higher Government Positions. If you want immediate appointment, send **TODAY** for our schedule showing dates and locations of the Spring examinations. Any delay means the loss of just so much time in preparing yourself for examination.

SEND COUPON BELOW

FRANKLIN INSTITUTE
Dept. H 109, ROCHESTER, N. Y.

The coupon, filled out as directed, entitles the sender to a free copy of our book, "Government Positions and How to Obtain Them," and to consideration for Free Coaching for the examination here checked.

COUPON

..... Railway Mail Clerk (\$800 to \$1400)	..... Customs Positions (\$600 to \$1800)
..... Postoffice Clerk (\$800 to \$1200)	..... Internal Revenue (\$700 to \$1800)
..... Postoffice Carrier (\$800 to \$1200)	..... Stenographer (\$600 to \$1500)
..... Rural Mail Carrier (\$500 to \$900)	..... Clerk in the Departments at Washington (\$500 to \$1500)
..... Bookkeeper (\$900 to \$1800)	

Name

Address H 109

Write plainly.

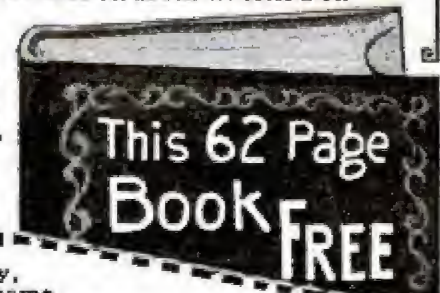


\$3,000 to \$10,000 Per Year For You

I can make you prosperous. If you want to earn more money—if you want to establish yourself in an independent business requiring no capital—send me your name and address on coupon below, (for a postal will do) and I will mail you, free, our **Big 62-Page Book**, fully explaining just how you can do yourself to earn big money in the **Real Estate, Brokerage and Insurance Business**. Our thoroughly tested successful system not only equips you fully on every point of Real Estate, Brokerage and Insurance, we also give you, free, a valuable course in Commercial Law. Our Free Book is of great interest to anyone, but is of vital importance to Clerks, Bookkeepers, Salesmen, Agents, Solicitors and others who are ambitious to be in a good paying business of their own.

International Realty Corp., 1436 Manhattan Bldg., Chicago
Successors to The Cross Co. and H. W. Cross & Co.

This Book Shows You How to Succeed in Real Estate, Brokerage and Insurance



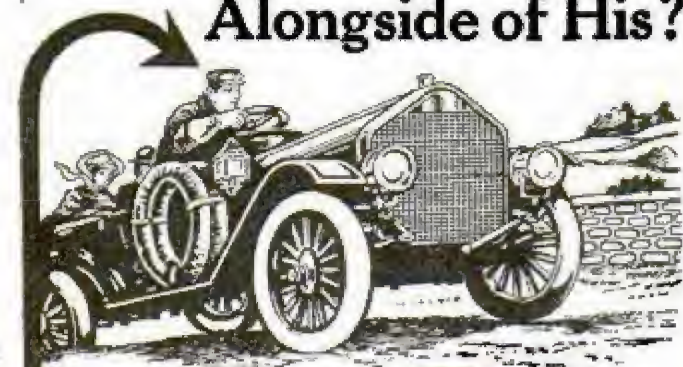
Send no money, but merely your name and address on a postal or on the Coupon below.

NAME

ADDRESS

Please Mention Popular Mechanics

How's Your Job Alongside of His?



You can take his place

Do you want to "get ahead?" If you will let us we can show you how to become an expert auto driver—like the man at the wheel. His job isn't work—it's a cinch. Such experts

Earn \$35. to \$50. a Week

and there is a big demand for them. Our Home Study Course trains you in your own home in a few weeks' time. A Small Down Payment Starts You. Separable Models of working parts showing every detail and movement free to every student. Write today for our Free prospectus, with Samples of lessons. We assist to better positions.

We are in constant touch with owners and garages requiring competent men.

BUFFALO AUTOMOBILE SCHOOL

The auto school that comes to you.

44 Centaur Building

BUFFALO, N. Y.



HOW TO SPEAK IN PUBLIC

Give **Grenville Kleiser**, (formerly of Yale Faculty), fifteen minutes of your time daily at home and he will teach you how to make after-dinner speeches, propose toasts, tell stories, make political speeches, address board meetings.

His Mail Course will help salesmen sell more goods, develop power and personality, improve memory, increase vocabulary, give poise and self-confidence; it will help a man earn more, achieve more. "Your course has been of great service to me in my business, and I commend it to others in the highest terms," says **JOSEPH P. DAY**, New York's foremost auctioneer.

If you'll write to-day, we'll tell you all about it by mail.

FUNK & WAGNALLS COMPANY, Dept. 162, New York

CORNET FREE!

We guarantee to teach you to play by mail and will give you a Beautiful Cornet or any Band Instrument absolutely FREE. You pay weekly as lessons are taken. Instrument is sent with first lesson. Write to-day for our booklet and wonderful tuition offer.

INTERNATIONAL CORNET SCHOOL
464 Musical Hall, Boston, Mass.

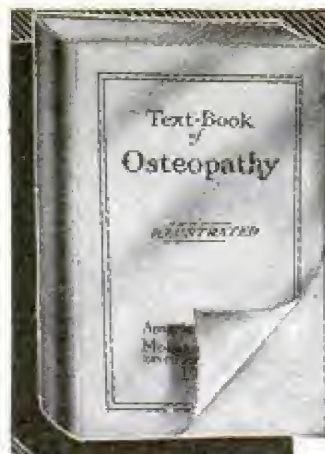
LEARN JEWELERS' ENGRAVING

A high-salaried and easily learned trade, taught thoroughly by mail. We will teach the beginner better engraving than he can gain in years of rigid apprenticeship. We will also improve the skill of any engraver. Send for our catalog. The Engraving School, Dept. 112, Page Building, Chicago Ill.

IF YOU STAMMER

attend no school till you hear from me. Largest school in the world, employing the advanced natural method for the cure of stammering, stuttering, etc. No sing-songing or time-beating. If let run, stammering will wreck your life's happiness and handicap your endeavors. I cured myself and thousands of others by my method and can cure you. Beautiful 128 page book and Special Rate sent FREE.

Leo Wells Millard, Pres. North-Western School for Stammerers, Inc., 917 First St., Milwaukee, Wis.



THIS BOOK ON Osteopathy

ABSOLUTELY FREE

Just 100 pages (profusely illustrated) containing complete information, concerning the theory and practice of Osteopathy, together with a full explanation of the profit and honor that comes to Practitioners of the Science of Mechano-Therapy (Drugless Healing); a

Science far simpler and more comprehensive than Osteopathy—sent absolutely Free to readers of

Thousands of successful Practitioners all over the civilized world attest to the ability of the American College of Mechano-Therapy, to educate men and women in class or by correspondence in this highly profitable and honorable profession. Eighteen millions of people in the United States today call in a Drugless Healer when they are sick.

MANY OF OUR GRADUATES EARN FROM \$10 TO \$30 PER DAY

The object of the College, in presenting you with this free text book on Osteopathy, is to enable us to more clearly define—to give you a more thorough understanding—of the Science of Mechano-Therapy (Drugless Healing). We gladly take the loss entailed by this presentation.

Send us two 2-cent stamps to cover postage, and we will send you this book immediately, with our compliments. Address

American College of Mechano-Therapy
Dept. 461, 120-122 Randolph Street, Chicago, Ill.

Government Positions

45,837 Appointments were made to Civil Service places during the past year. Excellent opportunities for young people. Each year we instruct by mail thousands of persons who pass these examinations, and a large share of them receive appointments to life positions at \$840 to \$1,500 a year. If you desire a position of this kind, write for our Civil Service Announcement, containing full information about all government examinations and questions recently used by the Civil Service Commission.

COLUMBIAN CORRESPONDENCE COLLEGE, WASHINGTON, D. C.

LEARN WATCHMAKING

Engraving and Jewelry Repairing. Practical specialists in charge of all instruction. Students trained for the best paying positions. Earn while learning. Our school is endorsed and recommended by leading jewelers. A few months will make you an expert. Positions secured for graduates. Demand for watchmakers greater than the supply. Write for free catalog.

CHICAGO SCHOOL OF WATCHMAKING
Dept. 20, Bush Temple, CHICAGO



Learn Engraving

by mail. Catalog and first lesson FREE. Easily Learned. **BIG SALARIES**

ESTABLISHED 22 YEARS

Rees Engraving School Dept. M, Granite Bldg., ROCHESTER, N. Y.

WANTED MEN

Prepare as **Firemen, Brakemen, Electric Motormen, Colored Train Porters.** Hundreds put to work; \$65 to \$150 a month. No experience necessary. **500 More Wanted.** Enclose stamp for Application Blank and Book. State position wanted.

I. RAILWAY C. I., DEPT. 35,
INDIANAPOLIS, INDIANA.



LEARN TO REPAIR AND RUN AUTOMOBILES



EARN BIG MONEY IN AUTOMOBILE BUSINESS

as a chauffeur, repairman, salesman. Work pleasant. Big demand for trained men. Fine chances for starting automobile liveries, agencies, taxicab and repair companies. Learn the automobile—every part, and its mechanical operation thoroughly and practically in a few weeks. Write today for our interesting free book and learn about the tremendous opportunities everywhere in

this new business and our excellent course of training.

KANSAS CITY AUTOMOBILE SCHOOL

(Conducted by CLIFF HOGAN)
(Largest and Best Equipped Automobile School in America)
2139 E. 15th Street, Kansas City, Mo.



COPY THIS SKETCH

and let me see what you can do with it. You can earn \$20.00 to \$125.00 or more per week, as illustrator or cartoonist. My practical system of personal individual lessons by mail will develop your talent. Fifteen years successful work for newspapers and magazines qualifies me to teach you. Send me your sketch of President Taft with 6¢ in stamps and I will send you a test lesson plate, also collection of drawings showing possibilities for YOU.

THE LANDON SCHOOL OF ILLUSTRATING AND CARTOONING
1438 Schofield Building, Cleveland, Ohio.



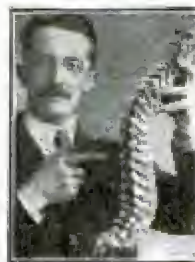
I TEACH SIGN PAINTING

HOW CARD WRITING or LETTERING by mail and guarantee success. Only field not overcrowded. My instruction is unequalled because practical, personal and thorough. Easy terms. Write for large catalogue.

CHAS. J. STRONG, Founder

DETROIT SCHOOL OF LETTERING
DEPARTMENT PM, DETROIT, MICH.

"Oldest and Largest School of its Kind"



LEARN CHIROPRACTIC

The new method of drugless healing
EARN \$50 TO \$100 PER WEEK

Our free book tells how you can learn to detect disease and remove the cause by Howard's method of Spinal Adjustment. Positively the most simple, direct, advanced and scientific method of drugless healing. Based on unerring natural laws. Anyone can understand it; learned in spare time. Improve your social prominence and financial standing. Start now on the road to honor and success. Write for free book and special scholarship offer.

NATIONAL SCHOOL OF CHIROPRACTIC
806 Wendell Building CHICAGO, ILL.

BE AN AUCTIONEER

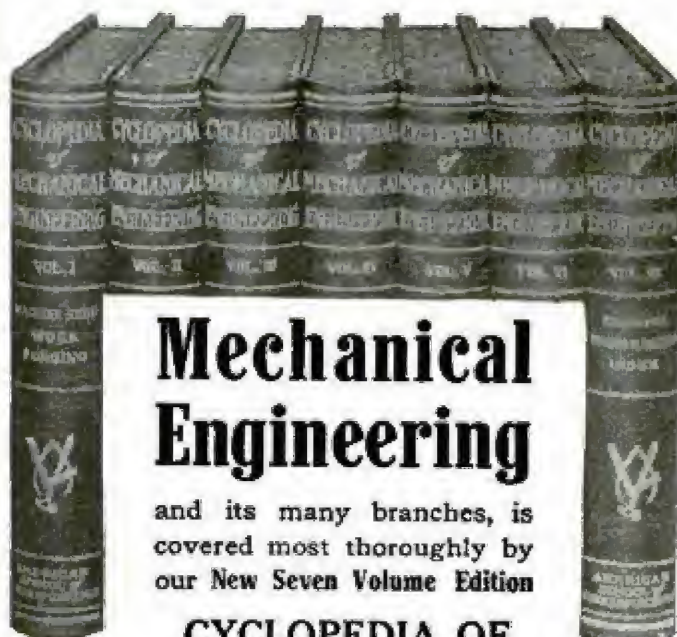
Send self-addressed stamped envelope for particulars. I teach it by mail.
O. A. Smith, Room H 26, 823 Bigelow St., Peoria, Ill.

ART STUDENTS Want To Make \$100?



Cash art assignments are given in every issue of the **Students Art Magazine**

also lessons in Designing, Illustrating, Cartooning, Lettering and Chalk-Talking. Students' work published. Articles by and about leading artists. Especially valuable to Art Students of all correspondence schools. You get experience doing commercial art work. Only \$1 for 12 months. Money back if not satisfied. Send subscription today to **Students Art Magazine**, Dept. 115 Kalamazoo, Mich.



Mechanical Engineering

and its many branches, is covered most thoroughly by our New Seven Volume Edition

CYCLOPEDIA OF

Mechanical Engineering and Modern Shop Practice

These seven great volumes contain 2,992 seven by ten inch pages of information which is of vital interest to every progressive mechanic.

In this wonderful work will be found instruction in Machine Shop Work; Assembling of Machinery; Tool Making and Shop Management in such simple and comprehensive form that the student cannot fail to benefit by it. Every detail of mechanical engineering is thoroughly analyzed and treated, rendering the books of unusual value to the experienced mechanic and shop manager, as you will note by reading "Subjects Thoroughly Covered."

The Cyclopedia is supplemented with a series of practical test questions and includes over 2,000 full-page plates, illustrations, tables, formulas and "shop kinks."

TO PROVE THEIR VALUE TO YOU

we will send you the complete Cyclopedia absolutely free for examination—just mail the coupon. Keep the books five days—apply the principles to your work—test every formula. You will agree that they are all we state, and more. Send \$2.00 after examination and \$2.00 a month until you have paid the special price of \$18.80. The regular list price is \$36.00. If the books do not meet with your requirements, advise us and we will remove them at our expense.

Subjects Thoroughly Covered

Machine Shop Work—Vertical Milling Machine—Motor-driven Shops—Shop Lighting—Forging—Electric Welding—Tool Making—Metallurgy—Manufacture of Iron and Steel—High-Speed Steel—Flaws in Castings—Electric Lifting Magnets—Magnetic Clutches—Making a Machinist—The Ideal Foreman—Pattern Making—Foundry Work—Automatic Coal and Ore Handling Appliances—Machine Parts—Construction of Boilers—Types of Boilers—Boiler Accessories—Steam Pumps—Air Compressors—The Steam Engine—The Steam Turbine—Indicators—Valve Gears—Refrigeration—Gas Producers—Gas Engines—Automobiles—Elevators—Sheet Metal Work—Practical Problems in Measurement—Mechanical Drawing—Drafting Room Organization—Machine Design.

SPECIAL OFFER IF YOU MAIL COUPON PROMPTLY For a short time we will include, as a monthly supplement, for one year, the **TECHNICAL WORLD MAGAZINE**. This is a regular \$1.50 monthly, full of Twentieth Century Scientific Facts, written in popular form. Also contains the latest discussions on timely topics in invention, discovery, industry, etc.

Free Examination Coupon

American School of Correspondence, CHICAGO, U. S. A.

Please send set Cyclopedia of Mechanical Engineering for 5 days' free examination. Also Technical World for 1 year. I will send \$2 within 5 days and \$2 a month until I have paid \$18.80, or notify you and hold the books subject to your order. Title not to pass until fully paid.

NAME.....

ADDRESS.....

OCCUPATION.....

EMPLOYER.....

Big Pay-Short Hours

Here's a trade that will make you independent. Shorter Hours, Bigger Pay—*demand always great.* Our practical methods—teaching by actual work at all phases of trade, with expert plumbers as instructors—enables you to do the work of a skilled plumber in a remarkably short time.

Many of our students are successfully established in the plumbing business for themselves—it takes but little capital and master-plumbers can make big money; short working hours. This is your opportunity—don't neglect it

Graduates of our school have no trouble in securing good positions at highest pay anywhere in this country. Our new catalog showing many illustrations of our school and students at work and giving full detailed information regarding our course, rates, etc., is **FREE**. Write for it today. It may be the first step to such prosperity as you had not dreamed of before.

Saint Louis Trades School,
4430 Olive St., St. Louis, Mo.



Learn Plumbing



DO YOU LIKE TO DRAW?

That's all we want to know

Now we will not give you any grand prize—or a lot of free stuff if you answer this ad. Nor do we claim to make you rich in a week. But if you are anxious to develop your talent with a successful cartoonist, so you can make money, send a copy of this picture with 6c. in stamps for portfolio of cartoons and sample lesson plate, and let us explain.

The W. L. Evans School of Cartooning
321 Kingmoore Bldg., Cleveland, O.

WHY GO TO "COLLEGE" TO LEARN BOOKKEEPING

WHEN I WILL MAKE A FIRST-CLASS BOOKKEEPER OF YOU AT YOUR OWN HOME

in SIX WEEKS for \$3 or REFUND MONEY! Distance and experience immaterial. I find POSITIONS, too, Everywhere, Free. Placed pupil Sept. 7, at \$25 Weekly. Perhaps I can place YOU too? Have 16,019 Testimonials! **SAVE THIS AND WRITE**

J. H. GOODWIN, Expert Accountant
Room 821, 1215 Broadway, New York

CAN YOU DRAW?

Our Graduates
Are Filling High Salaried Positions

EARN \$25 TO \$100 PER WEEK

in easy, fascinating work. Practical, Individual Home Instruction. Expert Instructors. Superior equipment. Founded 1899. Twelve years' successful teaching.

Financial Returns Guaranteed.

Complete Courses in Commercial, Fashion, Magazine, Book and Advt. Illustrating; Newspaper, Cartooning, Lettering, Designing, Show Card, Architectural Perspective, Photo Retouching, Normal, Color, General Drawing, etc.

FREE ARTIST'S OUTFIT of fine instruments and supplies to each student.

Write for particulars and Handsome Art Book.

SCHOOL OF APPLIED ART
E 175 FINE ARTS BLDG.
Battle Creek, Mich.

Our Own Fireproof Bldg.

SHORTHAND IN 30 DAYS

We absolutely guarantee to teach shorthand complete in only thirty days. You can learn in spare time in your own home, no matter where you live. No need to spend months as with old systems. Boyd's Syllable System is easy to learn—easy to write—easy to read. Simple. Practical. Speedy. Sure. No ruled lines—no positions—no shading as in other systems. No long lists of word signs to confuse. Only nine characters to learn and you have the entire English language at your absolute command. The best system for stenographers, private secretaries, newspaper reporters and railroad men. Lawyers, ministers, teachers, physicians, literary folk and business men and women may now learn shorthand for their own use. Does not take continual daily practice as with other systems. Our graduates hold high grade positions everywhere. Send today for booklets, testimonials, etc.

Chicago Correspondence Schools

969 Chicago Opera House Block, CHICAGO, ILL.

New York Electrical School

Offers to men and boys a theoretical and practical course in applied electricity without limit as to time.

Instruction individual, day and night school, equipment complete and up-to-date. Student learns by doing, and by practical application is fitted to enter all fields of electrical industry fully qualified. School open all year. Write for free prospectus.

44 West Seventeenth St., NEW YORK

ARITHMETIC

SELF-TAUGHT

A plain, easily-understood volume for all who have not had the opportunity of learning this subject thoroughly, or who have forgotten what they once learned. **257 Pages. Requires no teacher.** This great little book sent postpaid for **60 CENTS**. Stamps accepted, leather binding \$1

GEO. A. ZELLAR BOOK CO.
Est. 1876, 4462 W. Belle Place, ST. LOUIS, MO.

SPANGENBERG'S
PRACTICAL
ARITHMETIC
Self-Taught

YOU CAN BE A SALESMAN

EARN WHILE YOU LEARN

We have **Salesman's Positions** open in which you can secure **Practical Training** and earn good money while studying our course. Men equipped with our system of Practical Training earn from \$1,200 to \$5,000 a year. Positions now open. Address: **C. J. Brown, President.**

THE PRACTICAL SCHOOLS OF SALESMANSHIP

Box A15 Cleveland, O. Box A15 Ft. Worth, Tex. Box A15 N.Y. City

STAMMER NO MORE

I can cure you. Reputation world-wide. Established 16 years. Trial lesson explaining Home Instruction, with 200-page book, **FREE**. Answer at Once.

George Andrew Lewis, 178 Adelaide Street, Detroit, Mich.

MUSIC LESSONS FREE AT YOUR HOME

Write Today for our Booklet. It tells how to learn to play Piano, Organ, Violin, Mandolin, etc. Beginners or advanced pupils. American School of Music, 50 Lakeside Bldg., Chicago, Ill.



I TEACH

Penmanship

BY MAIL

I won the World's First Prize for best course in Penmanship. Under my guidance you can become an expert penman. Am placing many of my students as instructors in commercial colleges at high salaries. If you wish to become a better penman, write me. I will send you Free one of my Favorite pens and a copy of the Ransomian Journal.

C. W. Ransom, 718 Reliance Bldg., Kansas City, Mo.



Own a Jewelry Store!

**We Furnish
Everything!**

**Get Into Business
for Yourself!**

Here is a big opportunity for one influential man in every town.

During the next year we are going to establish a number of men in this best of all businesses.

These men we are going to make our partners.

By our system these men will soon become moneyed men in their community.

For these men we do much and we demand much in return. Not in money, but in brains, business ability and in character.

We are always on the lookout for the unusual men. For these men we do great things. Their opportunities are circumscribed only by their own ability to grow. Quick action is necessary. We can make arrangements with but one man in your town in this matter. If you are interested write us at once. Address

C. F. ELMORE, Financial Director

90 Wabash Avenue

Department 142

CHICAGO, ILL.



LEARN WATCHMAKING

Watchmaking pays and you can earn while you learn. Write for FREE BOOK, "How to be a Watchmaker." Postal brings it. Stone's School of Watchmaking, 912 Globe Bldg., St. Paul, Minn.



STAMMER

My book "How to Stop Stammering"—a treatise on "Scientific Talking"—direct to the point.

Write M. L. HATFIELD, 1462 Grove St., OAKLAND, CALIF.

LEARN TO WRITE ADVERTISEMENTS

IF YOU ARE EARNING LESS THAN \$25 A WEEK

we can positively show you by mail how to increase your salary. Send for beautiful prospectus, mailed FREE.

PAGE-DAVIS SCHOOL, Dept. 112, CHICAGO, ILL.



VENTRILOQUISM

LEARNED BY
ANY MAN
OR BOY
AT HOME
SMALL COST

Send today 2c stamp for particulars and proof.

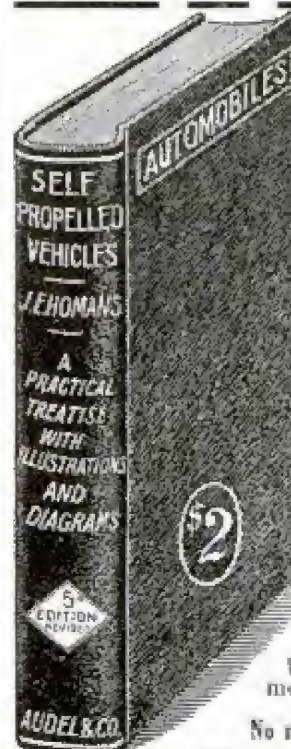
O. A. SMITH, Room D 4, 823 Bigelow St., PEORIA, ILL.

HYPNOTISM!

Wonderful science easily mastered by anyone. Send address for free book and other literature.

M. D. BETTS, Dept. 65, JACKSON, MICH.

How to Run an Auto



"Homans' Self Propelled Vehicles" gives full details on successful care, handling and how to locate trouble.

Beginning at the first principles necessary to be known, and then forward to the principles used in every part of a Motor Car.

It is a thorough 1910 course in the science of Automobiles, highly approved by manufacturers, owners, operators and repairmen. Contains over 400 illustrations and diagrams, making every detail clear, written in plain language. Handsomely bound.

Price \$2.00 postpaid, or sent
Free on Approval

The only way the practical merit of this MANUAL can be given is by an examination of the book itself, which we will submit for examination, to be paid for or returned after looking it over.

Upon receipt of the following agreement, the book will be forwarded:

No money in advance required, sign and return

THEO. AUDEL & CO., 69 Fifth Ave., NEW YORK, N. Y.
Kindly mail me copy of Homans' Automobiles, and, if found satisfactory, I will immediately remit you \$2, or return the book to you.

NAME.....

OCCUPATION.....

ADDRESS..... (Apr. Pop. Mech.)

Please Mention Popular Mechanics

If I Will Agree

To Get You A Position
Paying Good Wages

When You Graduate From My School of

Telegraphy

Will You Come?

My graduates are invariably given immediate employment by Railroads, Telegraph and Wireless Companies, because my school is recognized as the only one graduating thoroughly practical operators. Demand exceeds supply. If you want

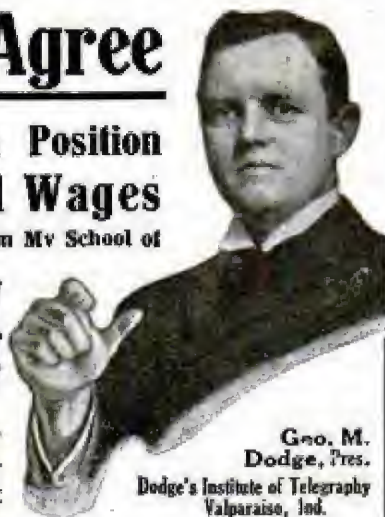
**Good Wages, Easy Work
and a Bright Future**

write today. I offer you advantages unequalled anywhere

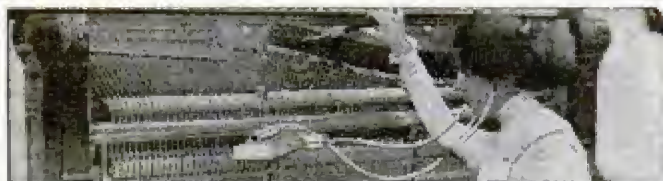
1. Oldest, Largest and most Successful Telegraph School in the World. 2. Expert Instructors. 3. Best Equipment—(we occupy exclusively two large modern buildings with R. R. train and Western Union wires and complete wireless station installed.) 4. Low Rates. 5. Easy Payments. 6. Living expenses earned while learning. Correspondence courses if desired. *New Course in Railway Accounting* makes my graduates proficient station agents. May be taken alone if desired. Write me today for illustrated descriptive catalog and interesting testimonials.

GEO. M. DODGE, Pres.

DODGE INSTITUTE OF TELEGRAPHY, 8th Street
VALPARAISO, IND.



Geo. M.
Dodge, Pres.
Dodge's Institute of Telegraphy
Valparaiso, Ind.



LEARN PIANO TUNING AT HOME by the aid of the TUNE-A-PHONE. A Profession that can be converted into money at any time or place in the civilized world at an hour's notice. Earn \$5.00 to \$15.00 per day. Valuable illustrated book FREE. Write NILES BRYANT SCHOOL OF PIANO TUNING, 31 Music Hall, Battle Creek, Mich.



I TEACH BY MAIL

WRITE FOR MY FREE BOOK

"How to Become a Good Penman"

and beautiful specimens. Your name elegantly written on a card if you enclose stamp. Write today. Address F. W. TAMBLYN, 418 Meyer Bldg., Kansas City, Mo.

Highland Park College

DES MOINES, IOWA



Enter
Any
Time

2000
Students
Annually

One of the most completely
equipped **ENGINEERING**
SCHOOLS in the country

Students may enter any time,
and their term is 12 weeks
from the day they enter.

Mention course in which you are interested. Address,

O. H. LONGWELL, President, Des Moines, Ia.



Learn Photography, Photo-Engraving or 3-Color Work

Engravers and 3-Color Operators Earn \$20 to \$50 Per Week. Only college in the world where these paying professions are taught successfully. Established 17 years. Endorsed by International Association of Photo-Engravers and Photographers' Association of Illinois. Terms easy; living inexpensive. Graduates assisted in securing good positions. Write for catalog, and specify course in which you are interested.
**Illinois College of Photography or 999 Wabash Av.
Bissell College of Photo-Engraving Effingham, Ill.
L. B. BISSELL, Pres.**



LEARN THE AUTO BUSINESS

EARN A SPLENDID SALARY

Chauffeurs, Auto Salesmen, Repairmen, Testers, Assemblers and Inspectors are in demand at big salaries. We have trained hundreds for good positions. Our home study course covers mechanism, operation and repairing and prepares for the best positions. Let us train you in your spare time and put you in line for a good auto job. Results guaranteed or no pay. Send today for free catalogue and names of successful graduates.
CLEVELAND AUTOMOBILE SCHOOL, 2167 East 9th St., Cleveland, Ohio
"THE SCHOOL THAT MAKES GOOD."

Great Eastern Trade School

TEACHES PRACTICAL

PLUMBING, BRICKLAYING or PLASTERING

IN A FEW MONTHS

No age limit—You can enter at any time. Day and Night Classes—Positions Secured. No Books—Tools take their places.

WRITE NOW FOR FREE CATALOG

44-48 East 32nd Street, NEW YORK CITY

Learn Watch Repairing

Be a watchmaker—you can learn this profitable trade by correspondence in a few weeks in your own home by the DeSelm's Chart System. After you complete the course you will know a watch from A to Z. You will know just what the matter is and how to repair one. When you graduate you will be a practical watchmaker and repairer and competent to fill any position. Positions for our graduates.

Ask for our Free Book. It explains our system and terms.

THE DeSELMS WATCH SCHOOL
23 Perry St. ATTICA, INDIANA



COURSES OFFERED

1. **CIVIL, ELECTRICAL AND MECHANICAL ENGINEERING COURSES.** Standard courses are offered in Civil, Electrical and Mechanical Engineering. Special opportunity is offered for making up work or for taking a complete course preparatory to the standard Engineering Courses. Shop work from the beginning comes in preparatory courses. See our new Engineering Catalogue.

2. SHORT COURSES

1. One Year Electrical Engineering Course
2. One Year Telephone Engineering Course
3. One Year Steam Engineering Course
4. One Year Machinists' and Automobile Course
5. One Year Course in Mechanical Drawing

practical and are intended for those who have but limited education and do not see their way clear to take a complete Engineering Course. The Machinists' Course is especially practical. The machine shop is the most complete to be found in connection with any Engineering School in the United States.

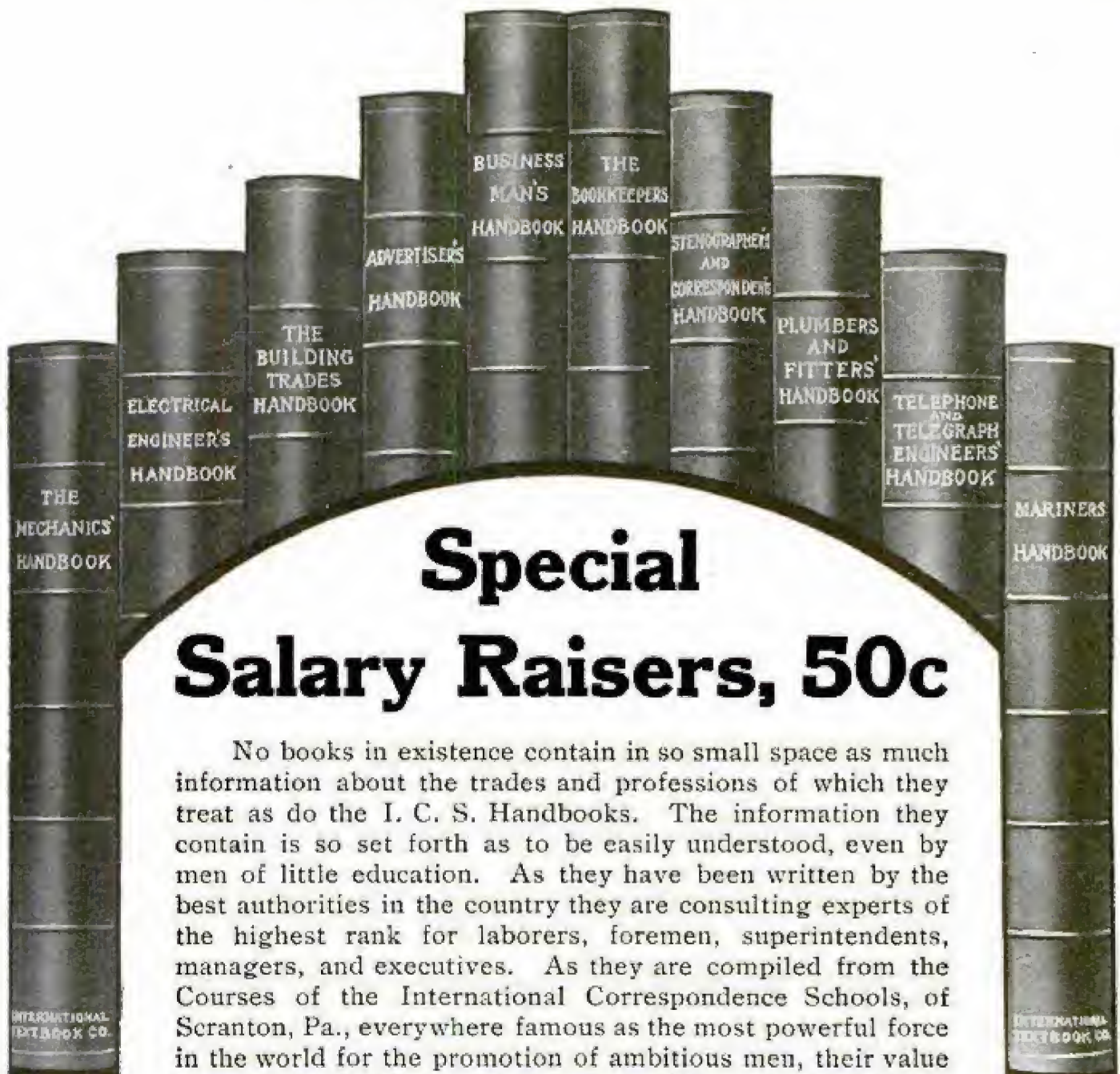
Just a fair common school education is all that is required for entrance to these courses. These courses are very

SPECIAL COURSES

1. **TRACTION ENGINEERING.** This is the most complete course in Traction Engineering offered by any Engineering School in the country. It may be completed in three months. Students are taught how to make all repairs on engines as well as to handle them. Four traction engines used for experimental purposes.

2. **GASOLINE AND AUTOMOBILE COURSES.** These courses may be completed in three months. They are exceedingly practical. Complete Chauffeur practice. Just a fair common school education is all that is necessary to enter.

3. **FARM BLACKSMITHING, FARM CARPENTRY.**



Special Salary Raisers, 50c

No books in existence contain in so small space as much information about the trades and professions of which they treat as do the I. C. S. Handbooks. The information they contain is so set forth as to be easily understood, even by men of little education. As they have been written by the best authorities in the country they are consulting experts of the highest rank for laborers, foremen, superintendents, managers, and executives. As they are compiled from the Courses of the International Correspondence Schools, of Scranton, Pa., everywhere famous as the most powerful force in the world for the promotion of ambitious men, their value to employes in subordinate positions will be quickly realized.

They are an indispensable help to quicker work that will command advancement. Every important item is indexed with all the initial letters under which it is likely to be sought. They are printed on high-grade book paper in clear type, and durably and handsomely bound in cloth with gilt titles. They contain on an average 364 pages and 175 illustrations and are regularly sold for \$1.25.

Special Offer: To better introduce the value of I. C. S. Textbooks and I. C. S. Training we will sell these books for a limited time to those sending to us this coupon and 50 cents.

International Textbook Co.

Box 872-P, SCRANTON, PA.

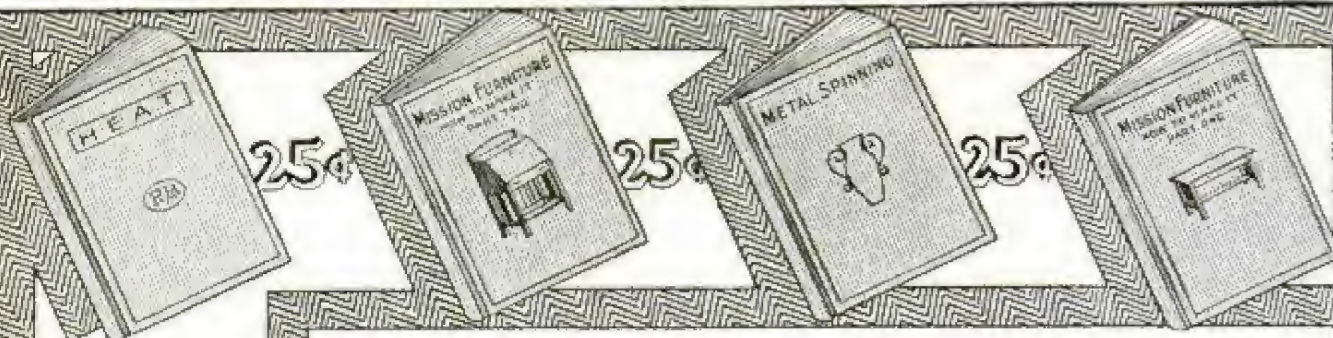
I enclose \$_____ for which please send me the books before which I have marked X.

<input type="checkbox"/> Mechanics' Handbook	<input type="checkbox"/> Advertiser's Handbook
<input type="checkbox"/> Elect. Eng. Handbook	<input type="checkbox"/> Business Handbook
<input type="checkbox"/> Bldg. Trades Handbook	<input type="checkbox"/> Bookkeeper's Handbook
<input type="checkbox"/> Plumb. & Fit. Handbook	<input type="checkbox"/> Sten. & Corr. Handbook
<input type="checkbox"/> Tel. & Tel. Handbook	<input type="checkbox"/> Mariners' Handbook

Name _____

St. and No. _____

City _____ State _____



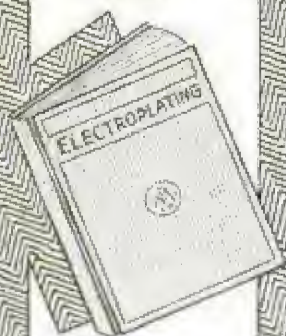
25c



25c



25c



25c



Popular Mechanics 25 Cent Series of Industrial Handbooks

"WRITTEN SO YOU CAN UNDERSTAND IT"

THESE books furnish reliable information on mechanical subjects at a price within the reach of all. They are convenient and uniform in size (5 by 7 in.) and neat and attractive in appearance; being bound in a good grade of durable cloth with artistic cover designs, printed in clear readable type on good book paper and fully illustrated.

A useful, compact library of mechanical books unequaled anywhere at the price

Each 25c Postpaid

THESE ARE READY

Mission Furniture, How to Make It, Part I.

96 Pages.

A handy little manual containing plain directions for making 21 designs, with working drawings and illustrations.

Mission Furniture, How to Make It, Part II.

128 Pages.

A companion volume to Part I containing 32 additional designs.

Arts-Crafts Lamps, How to Make Them.

96 Pages. By J. D. ADAMS.

Plain instructions for making 16 beautiful designs from paper, cardboard and wood. Good results can be obtained by anyone possessed of a fair amount of patience.

How to Make a Wireless Set.

96 Pages. By ARTHUR MOORE.

Explains in an understandable manner the construction of an outfit for transmitting 4 or 5 miles. This set can be easily constructed at a small cost by any boy of ordinary ability.

Metal Spinning. 80 Pages. By PROF. F. D. CRAWSHAW, University of Wisconsin.

The only book published on this interesting art. A practical working manual for those who desire to spin metal as an art recreation or to follow this work as a trade.

Heat.

128 Pages. By PROF. J. GORDON OGDEN, Ph. D., Prof. of Physics,

Fifth Avenue H. S., Pittsburgh.

An immensely interesting and instructive story pertaining to heat and its relation to modern mechanics.

Electroplating.

112 Pages.

A treatise which will not only enable the humblest beginner to make a start, but which gives pointers of value to even the most experienced electroplater.

Metal Work and Etching.

96 Pages.

A complete handbook for art metal workers giving every detail for making a great variety of useful and ornamental objects such as book ends, desk sets, arts and crafts jewelry, hinges, drawer pulls, paper knives, letter openers, match boxes, tie and pipe racks, pad corners, etc. Fully illustrated.

OTHER EQUALLY GOOD OR BETTER TITLES TO FOLLOW

A few convincing statements regarding this series

1. Regarding the Price:

"The wonder is that a cloth-bound book profusely illustrated with working drawings can be produced and sold at such a very moderate price. The descriptions and illustrations are excellent."—From review of Mission Furniture, Part II. in *Scientific American*.

2. As to Practicability:

Hattiesburg, Miss., Aug. 19, 1910

Popular Mechanics Co., 225 Washington St., Chicago
Sirs: Please find enclosed 25c for which send me Part Two Mission Furniture How to Make It, by mail, post paid. I have part I, and have made one piece of furniture and sold \$400.00 four hundred dollars worth of it, and I am not a carpenter either, but with the instructions "Written so I can understand it," I have a business of my own. Yours truly,

JOHN S. COLEMAN.

3. The High Character of Contents:

"This is the first book published in the English language on metal spinning. In spite of its price, 25 cents, it is an excellent little treatise on the subject. The book is well written and contains much information for those interested in the subject. It is well worth the price."—Review of Metal Spinning—*Brass World*.

Obtainable at News stands, bookstores or direct from the publishers.

Popular Mechanics Book Dept., CHICAGO

THE ONLY WAY

Between
CHICAGO
ST. LOUIS
PEORIA SPRINGFIELD AND
KANSAS CITY

"Alton" Trains
RIDE EASY

No Noise No Dust

Rock Ballast Roadbed

Perfect Passenger Service

Chicago & Alton R.R.

R. J. McKAY, General Passenger Agent, Chicago



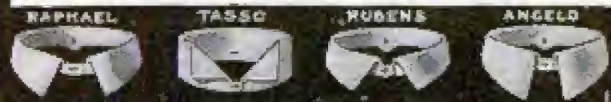
DO IT NOW

Send 6 cents in U. S. stamps for sample Linene Collar; or better still, get a box of 10 for 25 cents at the store, or send us 30 cents to cover expense of mailing you a box.

State size and style.

That's the way to find out how comfortable and convenient Linene Collars really are

REVERSIBLE COLLAR COMPANY
Department U, BOSTON, MASS.



ANTI-NICOTINE

"Get the Pleasure
Without the Poison"
(Trade Mark Reg.)
40c 3 FOR \$1.00



PIPE

**THE PIPE
THEY LET YOU
SMOKE AT HOME**

Looks and colors like meerschaum. Absorbs the nicotine and keeps on tasting sweet. You never had such an enjoyable smoke. Sent prepaid anywhere. Money back if not satisfactory.

Order 3 or More Today

H. MENGES, The Smokers' Friend
605 N. 7th St. ST. LOUIS, MO.

We have for sale a limited number of complete files of

Popular Mechanics for 1909

These consist of the 12 issues of the magazine and a complete index suitable for binding.

Price \$1.25 postpaid.

POPULAR MECHANICS, 225 Washington St., CHICAGO



127 KINDS IRON PUZZLES

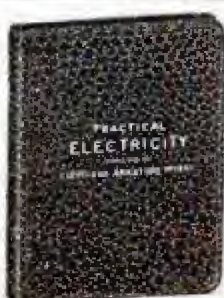
Sample, secret key and 36 page book of cuts of all 10c, 3 leaders 25c
WESTERN PUZZLE WORKS
St. Paul, Minn.

9,059-Word Business Book Free

Simply send us a postal and ask for our free illustrated 9,059-word Business Booklet, which tells how priceless Business Experience, squeezed from the lives of 112 big, broad, brainy business men, may be made yours—yours to boost your salary, to increase your profits. This free booklet deals with

- How to manage a business
- How to sell goods
- How to get money by mail
- How to buy at rock-bottom
- How to collect money
- How to stop cost leaks
- How to train and handle men
- How to get and hold a position
- How to advertise a business
- How to devise office methods

Sending for this free book binds you to nothing, involves you in no obligation; yet it may be the means of starting you on a broader career. Surely you will not deny yourself this privilege, when it involves only the risk of a postal—a penny! Simply say, "Send on your 9,059-word Booklet." Send to **SYSTEM, Dept. 81-4, 151-153 Wabash Avenue, Chicago**



A SCHOOL WITHIN ITSELF

There are XX chapters in all, XIX carrying you from the fundamental principles of electricity on through the various branches to a point where the careful student comprehends the complete designing, care and operation of a dynamo or motor, and one chapter on electric automobiles, outlining their construction, care and operation, and all about storage batteries and how to handle them. Each subject is carefully written and to the point. After a student studies a subject, he is questioned on that subject in such a manner as to bring clearly to his mind the points he needs to know regarding same. The book contains a dictionary defining 1500 Electrical Words, enabling the reader to ascertain the meaning of any electrical word, term or phrase used in this book, as well as hundreds of others in common use. All required tables necessary in the study are in it.

\$2.00 PER COPY—FIFTH EDITION—26,000 COPIES SOLD.

The offer we make of refunding money if book is not satisfactory upon examination is AN UNUSUAL ONE in connection with the sale of a book. But we have no fear of its return. Your decision will be what thousands of others have been. Money would not buy it if it could not be duplicated. We could print testimonials by the hundreds. It is best to order and be your own judge of its merits.

CLEVELAND ARMATURE WORKS, Cleveland, Ohio

Armatures and Fields Wound—Commutators Filled
AMERICA'S GREATEST REPAIR WORKS



*The only
Solution:*

Get a better job

Are you "trying to make both ends meet" on a small, unsatisfactory salary? Are you one of the thousands of energetic, capable men whose days are spent in work not suited to their natural talents?

Then read this wonderful offer. We mean it and there is a fine chance for you if you improve it.

If you lack the time and the means to stop work and take a course of training, the American School will lend you the cost of the training you need and let you make your own terms for repaying us.

This is the greatest offer ever made to men who have "got it in them to rise," and we are prepared to help everyone who comes to us in earnest.

Check the coupon, mail it to us, and we will explain fully our "Deferred Tuition" plan, how we will lend you the cost of the tuition, and allow you to pay us back when the increase in your yearly income equals the amount of the loan.

No Promotion — No Pay — that's what our "Deferred Tuition" Scholarship means. Send the coupon today and prepare for a better job.

AMERICAN SCHOOL OF CORRESPONDENCE
CHICAGO, U. S. A.

Opportunity Coupon

American School of Correspondence, Chicago, U. S. A.

Please send me your Bulletin and advise me how I can qualify for the position marked "X." Pop. Mech. 4-'11

..... Bank-keeper	..... Draftsman
..... Stenographer	..... Architect
..... Accountant	..... Civil Engineer
..... Cost Accountant	..... Automobile Operator
..... Systematizer	..... Electrical Engineer
..... Certified Public Acct't	..... Mechanical Engineer
..... Auditor	..... Moving Picture Op'r
..... Business Manager	..... Steam Engineer
..... Commercial Law	..... Fire Insurance Eng'r
..... Reclamation Engineer	..... College Preparatory

NAME

ADDRESS

Please Mention Popular Mechanics

Popular Mechanics Magazine

WRITTEN SO YOU CAN UNDERSTAND IT

Vol. 15

APRIL, 1911

No. 4

LOWERING 300 TONS BY HAND

By E. F. STEARNS



How the Bottom of the Largest Gas Holder in the World, Weighing 600,000 Pounds, was Lowered Into Position by 184 Men with Jacks

TO move by hand power alone a solid circle of metal 250 ft. in diameter and weighing about 600,000 lb. might reasonably be considered impossible; yet that is what was recently accomplished by lowering into its permanent position the bottom of the world's largest gas holder, which is being constructed at Kingsbridge for the Consolidated Gas Company of New York City.

The bottom was built of plates $\frac{3}{8}$ in. in thickness up to the outer course, where $\frac{5}{8}$ -in. plates were used; and since the riveting plainly could not

be done while resting upon the level concrete foundation which had been prepared for the bottom, it was assembled upon blocking at an elevation of 30 in. The construction of the enormous disk completed, the proposition was to lower it into place so evenly that no undue strain would come upon any one spot, and at the same time to use apparatus of such character that none of the machinery would be caught under the bottom at the end of the operation.

To this end 184 jackscrews of a type developed through years of experience

for this specific purpose were distributed around the rim and at 15 by 20 ft. intervals over the entire area. The screws were of 2-in. diameter and two



The Jack by Which the Man is Standing is the Type Used through the Holes in the Bottom of the Tank. The Jack at the Right is the Type Used at the Rim.

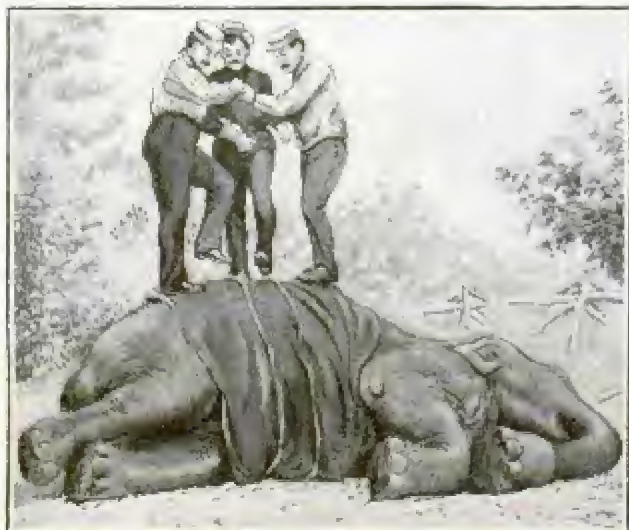
different styles were used. The type used over the surface passed through 7-in. round holes, cut in the bottom, and rested upon 6-in. circular plates on the concrete foundation. Around each screw was a threaded collar, from which were hung two steel straps, these being fastened to short pieces riveted in turn to the plate itself, so that the entire bottom was suspended from the jackscrews by the collars and the straps. In this type, the nut traveled downward as the lowering proceeded.

With the jack used at the rim, on the contrary, the screw itself moved

down, the elevation of the collar or nut remaining the same. These jacks each consisted of a frame standing clear of the rim, with a foot, attached to the lower end of the screw, projecting under the edge of the bottom plate and thus supporting it. The screw was lowered by turning a heavy nut on top of the frame.

The jacks having been set in position, the concrete bottom was thoroughly cleaned and spread with a layer of sand and Portland cement, dry, to furnish a bed into which the rivet heads of the bottom could sink. A few turns having been given to raise the bottom from the blocking, the latter was removed, and the hand levers of all jacks were set parallel and pointing in the same direction, with a man stationed at each jack. At the stroke of a bell, each screw was turned half a revolution, leaving all the bars again in the same line, but pointing in the opposite direction. Under the watchful eyes of half a dozen careful foremen, this simple performance was repeated again and again until the bottom was home.

The jackscrews and footplates were then removed, and water let in through the jackholes to hydrate the mixture of sand and cement; and covers having been bolted over the holes, the task was over—without a puff of steam or the turn of an engine.



A Mustard Plaster Has Been Applied to the Body of This Elephant as a Cure for Stomach Ache, and the Keepers Are "Rubbing It In."

MUSTARD PLASTER CURES ELEPHANTINE PAIN

A mustard plaster and a dose of gin and ginger comprise the cure for elephantine stomach aches in the New York Zoo. Elephants, especially those lately arrived from the tropics, are liable to stomach ache of a nature sufficiently extreme to cause them to roll on the ground in agony. The external application of mustard and internal application of gin and ginger soon bring relief.

In applying the mustard poultice, a blanket is wrapped around the body of the prostrate animal and upon this is

placed a thick layer of mustard. Then another blanket is thrown over the mustard and securely bound. As depicted in the illustration, the keepers are apparently working the mustard in by stamping upon the poultice.

HOMICIDE BY AEROPLANE THE NEWEST CRIME

Homicide by aeroplane is a new type of crime made possible by the extended use of the heavier-than-air machine. The technical definition of the crime is "homicide by imprudence" and two persons have already been convicted of it in France. One of them, M. van den Heuvel, was sentenced to pay a fine of \$10 to the state and to pay the widower of a woman killed by his machine \$1,000. The accident occurred at Issy-les-Moulineaux. The woman was walking along the public footpath and was knocked down by one of the wings of the airman's machine. M. Baillod, another airman, who ran his machine into a crowd of people, killing a young girl and injuring three other persons, was sentenced to pay \$40 fine and spend one month in jail.

WIRELESS OPERATOR TALKS THROUGH HIS HAT

The expression "talking through his hat" can no longer be used as indicating an erratic state of mind. A Philadelphian, Frank Chambers, talks through his hat as a means of communicating with his wife and friends and does it in all seriousness. He is a wireless enthusiast and in experimenting with various novel methods of enticing the winged words from the air he has hit upon the most simple of all plans, that of talking through his hat.

Chambers wears a $7\frac{1}{4}$ hat, and could work his new wireless plan through the medium of an ordinary Derby hat, but to make the experiment more interesting he tried it with a high silk hat.

The entire outfit consists of a small



Receiving a Message, while Standing on a Manhole

coil of wire, a pair of receivers for the ears, with the clamp that joins them, and a small electrical device that he suspends from the buttonhole of his coat. From this run wires, carried out of sight down the legs of his trousers and so to the ground to complete the circuit. The entire outfit fits easily in the crown of the high silk hat. The first experiment was made at a telegraph pole to which was attached one of the ordinary guy wires. Clipping his own wire to this guy wire Chambers fastened the trailing end of another to a fire plug and listened to messages sent by his wife from his home, from the Navy Yard and even from New York. The ticking of the various wireless messages that were darting back and forth overhead was distinctly audible through the receivers.

PERFORATED WHEELBARROWS AS GRAVEL WASHERS

Perforated wheelbarrows were utilized to wash the gravel used in concrete construction at Bangor, Maine.



Washing Gravel in Perforated Wheelbarrow

The gravel contained a certain amount of loam, which it was considered necessary to remove. Ordinary wheelbarrows were practically converted into sieves by punching holes in the sides and bottoms, and a water pipe was connected up between the storage piles and the concrete mixer. Each wheelbarrow of gravel was wheeled under the spray head and streams of water

discharged upon it, the water and loam passing out through the holes, leaving the clean gravel to be wheeled to the mixer. A spade was used to stir up the load so as to expose the bottom layers to the cleansing action of the water.

BRITISH FAVOR AMERICAN RAISED-CABIN CRUISER

The summing up of the series of contributions received by the British Motorboat magazine from its readers leads to the conclusion that the English motorboat enthusiast believes the American raised-cabin cruiser to be the ideal type.

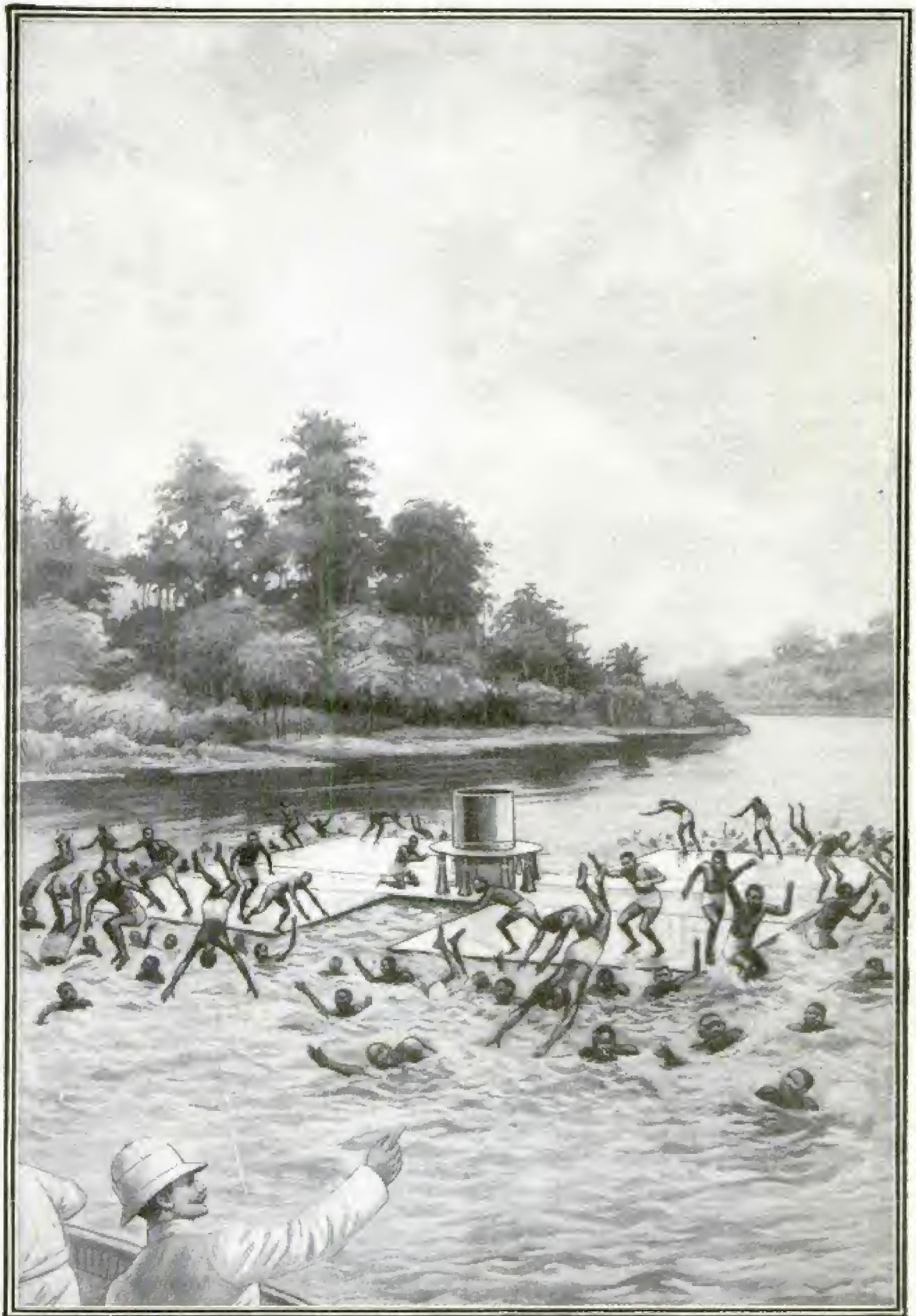
"Perhaps the most notable feature about the designs has been the preference shown by readers for the American type of cruiser," says the British magazine in an editorial. "America, it has always been acknowledged, has taken up the cabin cruiser as we in this country have favored the touring motorcar, and in consequence a great deal has been heard of American cruisers to the detriment of British boats. But we were scarcely prepared to find that the type of boat favored in the States had so impressed itself upon the minds of marine motorists in this country."

SWIM REQUIRED WITH EVERY FOOT OF BORE CASING RAISED

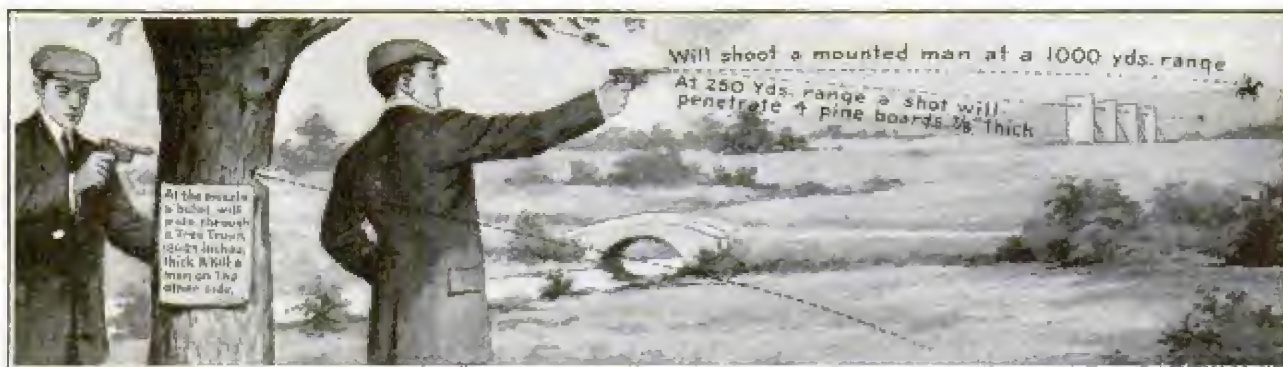
A method of raising bore casings by sinking a pontoon with man-weight, and then having the men jump overboard as the quickest means of removing the weight, was successfully adopted on the Aruwimi River in Africa.

The boring operations were being carried on from pontoons for the purpose of ascertaining the value of gold-bearing gravels in the bed of the river, and it was necessary for economy's sake to recover the casings on the completion of each bore. The ordinary method of hammering up the pipes

could not be employed because of the lack of certain mountings, and to screw them up with jacks was too slow. Consequently, a wide flanged collar was bolted round the casing and jacks were placed under the collar. Then some 80 natives were crowded on board the pontoon, which sank about a foot, the jacks meanwhile being screwed up tight. Before the deck was awash, all hands jumped overboard, and the pontoon rose, dragging the pipe with it. The process was repeated until the pipes were sufficiently loose to be pulled direct.



RAISING BORE CASING BY SINKING PONTON BY WEIGHT OF 80 NATIVES, WHO JUMP OVERBOARD ALL AT ONCE, THUS FORCING UP THE CASING



Courtesy The Graphic, London

Showing the Power of the Automatic Pistols Used by the Houndsditch Anarchists in London's Remarkable Battle

THE POWER OF AUTOMATIC PISTOLS

An excellent idea of the force of the bullets projected from the later types of automatic self-loading pistols may be gained from this illustration. With the muzzle held close, the bullets will perforate a steel plate a tenth of an inch thick, or will pass through a tree trunk 18 to 24 in. thick and kill a man

on the other side. At 250 yd. range a bullet will penetrate four pine boards, each $\frac{7}{8}$ in. thick, set as shown in the illustration.

The pistols weigh about $2\frac{1}{2}$ lb., and an experienced user can fire seven shots a second, or 80 aimed shots a minute, including the reloading of the magazine.

GEESE AND HORSES HAVE PARTS IN OPERA

While unfeeling critics might assert it is not the first, they all agree that the best trained flock of geese, that ever adorned the operatic stage, was that which formed an important part of the grand opera, "Die Königskinder" ("The King's Children"), produced this



Geraldine Farrar and the Flock of Trained Geese that Have an Important Part in the New Opera, "Die Königskinder."

season at the Metropolitan Opera House in New York. Miss Geraldine Farrar was the prima donna of the performance but she was forced to divide her honors with the geese, the latter being an exceptionally fine-looking and well-drilled collection of fowls. The creatures of the barnyard seem to have entered largely into at least two of the most important operatic productions of the season. In addition to the geese which make frequent appearances on the stage in "Die Königskinder," Signor Caruso and his fellow singers in "The Girl of the Golden West" were materially assisted by the trained horses used in the production.

Wireless equipment is now compulsory on all Austrian ships carrying passengers from Austria to ports beyond Gibraltar and the Suez Canal. Austria is said to be the first country to adopt such a measure.

The New York subway carried 270,321,490 passengers in 1910.

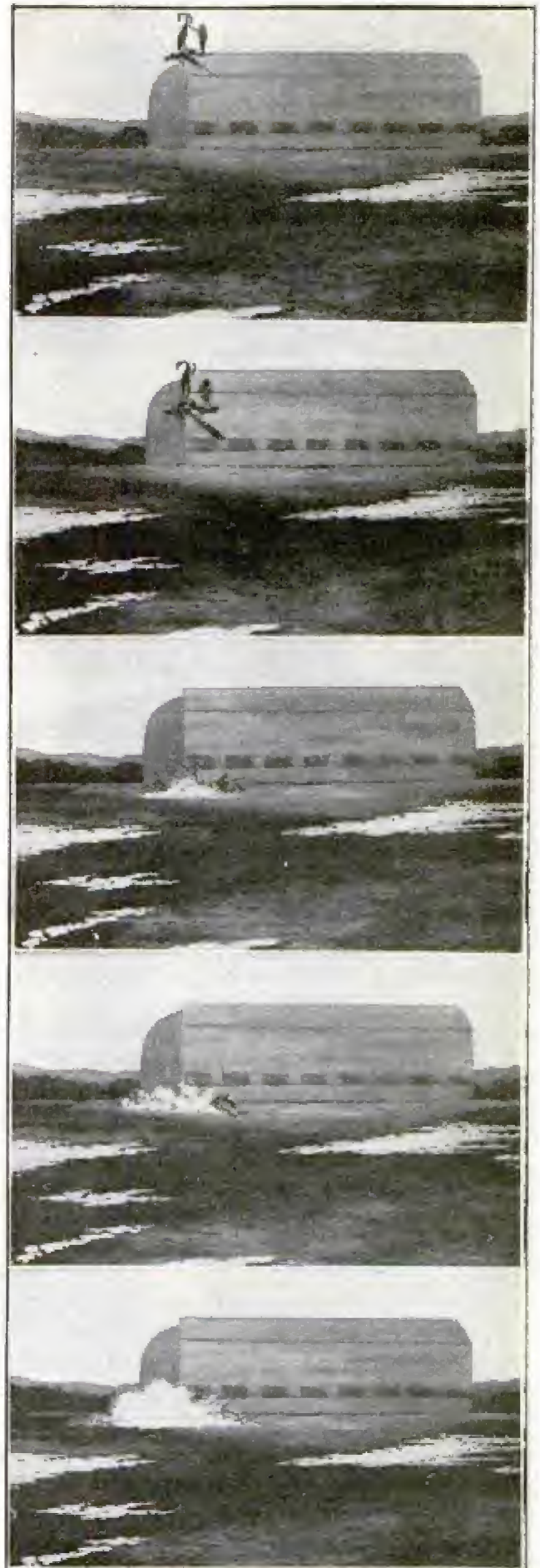
MOVING PICTURES SHOW AEROPLANE FATALITY

A moving-picture film of the aeroplane accident which cost two men their lives was made in France when M. Laffon and M. Paula were dashed to death on the aviation field at Issy-les-Moulineaux. The moving-picture camera had been set up on the field to make some aeroplane pictures of the flights and just happened to be in condition to make pictures when the accident to Laffon's machine occurred. Paula was a passenger with Laffon. The camera was quickly turned toward the falling machine and a series of pictures made which shows the exact condition of the machine as it fell and how it struck the earth. The first picture on the film showed the machine beginning to fall and the fall was followed and faithfully reproduced, the film ending with the broken, twisted machine lying on the ground.

REDUCTION-GEAR COUPLING FOR TURBO-GENERATOR

Designed originally for coupling a high-speed marine steam turbine to a slow-speed ship's propeller, in order to obtain the highest efficiency of both of these units, the Melville-Macalpine reduction gear has found its first important commercial application in driving a slow-speed direct-current electric generator by means of a high-speed turbine in the power house of an electric railway company at San Diego, California.

The steam turbine is adapted for directly driving an alternating-current machine, but not a direct-current dynamo, in the larger sizes, on account of the fact that the turbine is efficient only at high speeds, while the large direct-current generator is a comparatively slow-running machine; hence the necessity for "gearing down," a mechanical problem which was not commercially possible until the new efficient reduction gear was introduced a few months ago.



Part of the Series of Moving Pictures Showing Aeroplane Accident Which Cost Two Men Their Lives

UPSET DOES NOT DAMAGE MODERN FIRE ENGINE

The principles on which modern fire fighting apparatus are constructed received a severe test in Coatesville, Pa., recently when an engine was thrown violently over on its side and against



Coatesville, Pa., Fire Engine Undamaged, Though Completely Upset

a fence without doing material damage to any of its parts. The gauge glasses were not even cracked, although one rod supporting the suction hose was bent as was also a small plate in the rear of the driver's seat. The engine was on its way to a fire when it "skidded" in making a turn and was toppled over into an unprotected culvert $3\frac{1}{2}$ ft. deep. The culvert saved the apparatus from going over a retaining wall and taking an 8-ft. drop, however. The foreman of the fire department, who was on the engine, and two other men escaped without a scratch. The engine was righted, cleaned and put into service almost immediately after the accident. A peculiar feature of the affair was that the horses drawing the engine were not even thrown down.

¶The demand for brass beds is steadily declining, owing to a steadily increasing call for three-piece bedroom suites.

PRESERVING LIVE BUGS BY COLD STORAGE

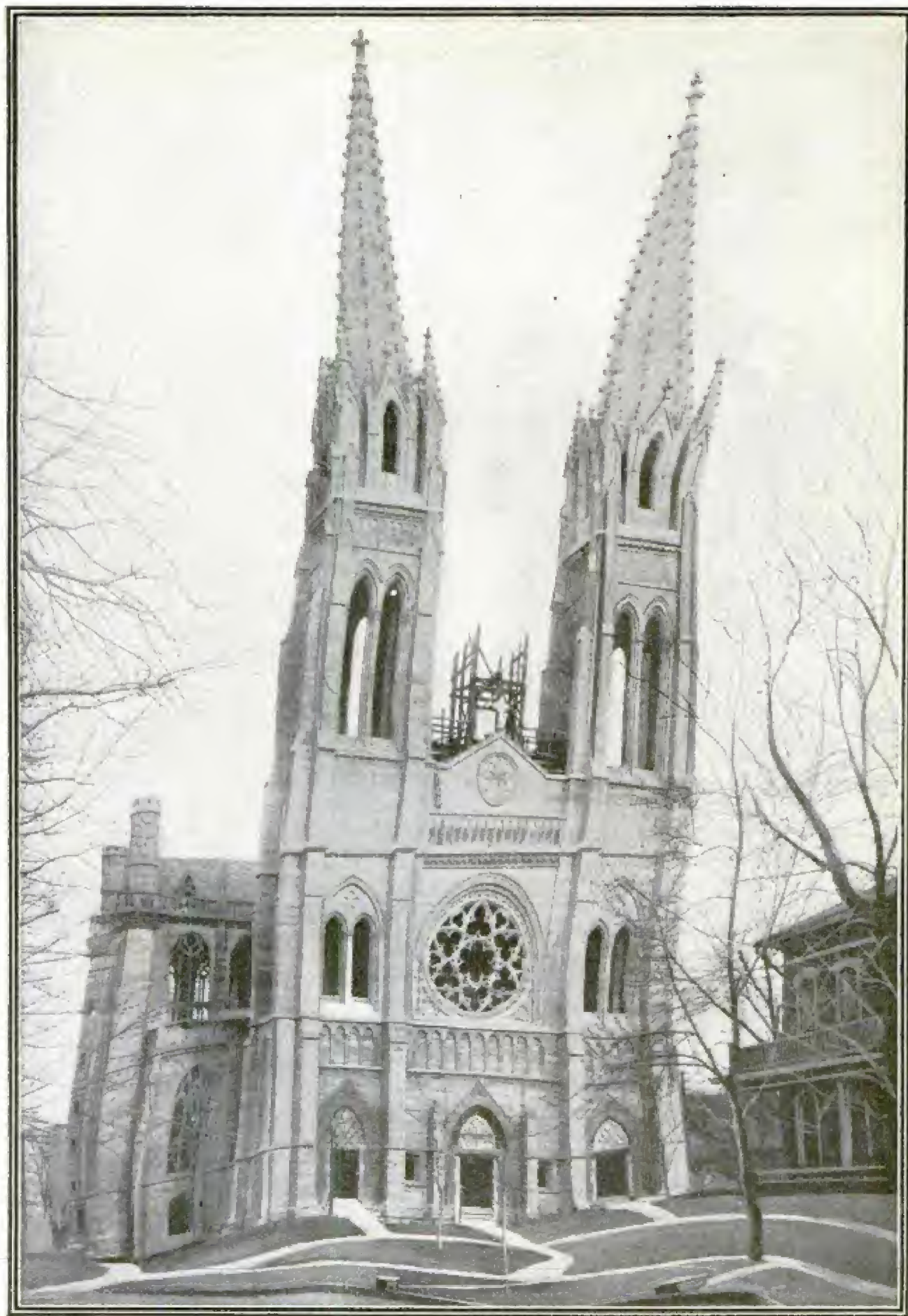
The immense number of ladybugs used every year by the California State Commission of Horticulture to destroy the aphids, which does such deadly mischief to the fruit trees and vines, are kept alive in cold storage until required.

The ladybugs, which congregate in great colonies in the high mountains, are located in the early fall, and sometimes in December and January. Four or five ton of them are collected and taken to the insectary. Packed in wood and screen boxes, 60,000 to a box, they are placed in specially built storage rooms, where the temperature is continuously kept around 40 deg. F. In this manner the ladybug colonies can be kept in perfect condition for six

months without food. The action of the cold storage is to arrest development and induce a condition similar to the natural hibernation.

FORTY YEARS WITHOUT A SINGLE HOLIDAY

The Washington pension office clerk who was promoted a few years ago because he had not taken a vacation in 14 years, was a loafer compared with five members of the Tokyo, Japan, fire department, who were recently decorated by the head of their department. These men were called before the entire fire-fighting organization at a review held in the Japanese capital and publicly thanked as men who "had distinguished themselves by diligence during their service of 40 years without taking a day's holiday." The thanks of the government was supplemented with substantial gifts of money.



EVILS OF ALCOHOL EXTEND TO PHOTOGRAPHY

The addition of a small quantity of alcohol to photographic developing fluid gave a Colorado photographer some startling results in the finishing of a negative made of a large church building. While most of the original lines of the picture were preserved, they were given a tipsy appearance.

MASKED MOUNTAINEERS WHO ARE NOT OUTLAWS

Experienced mountain climbers who scale glaciers or extensive snow fields usually wear masks or else blacken



Surveyors of U. S. Geological Survey Masked to Prevent Sunburn on Mountain Tops

their faces to prevent sunburn or scald caused by the intense reflection of the sun's rays from the dazzling white. Last season, in the government survey of the Mount Baker quadrangle in Oregon, United States geological surveyors scaled Mt. Baker, one of the great extinct volcanoes of the Cascade range. As shown in the picture, taken on the summit of the mountain, the men wore black masks. Others, impatient of such covering, suffered severely from sun scald.

PREVENTS METAL RUSTING BY ELECTRICITY

The phrase "a hair of the dog that bit me" has its scientific counterpart in a new electrical process, which, if successful on a commercial scale, will save untold millions of money by preventing rusting and corrosion of metals.

A great deal of the pitting and cor-

rosion of metals is caused by local electrical currents generated by the action of acidular water on dissimilar metals (often impurities in the metals themselves) at the points affected.

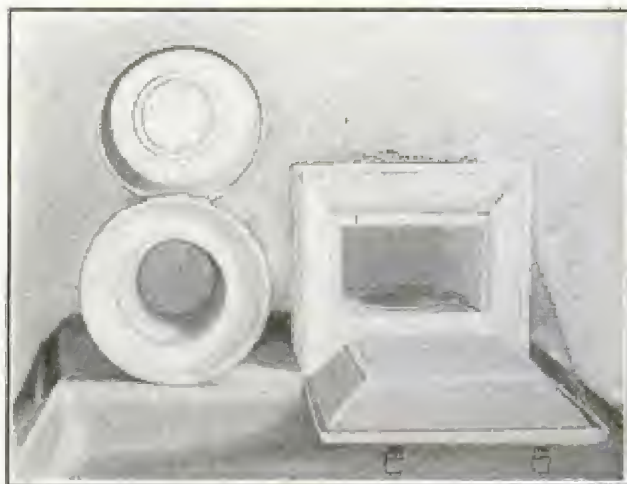
An Australian inventor has discovered that a weak electrical current, generated by a dynamo, and passed through the metals to be protected, will counteract the local electrical currents and effectually prevent corrosion. The amount of electricity required is very small and its regulation is said to be easy. The process is being tried out commercially on the locomotive boilers of the Canadian Pacific Railway.

REPAIR OLD BRIDGE WITH CEMENT FILLINGS

Two stone railroad bridges crumbling to pieces with age, in Hamburg, Germany, have been made strong and serviceable again by a novel application of cement mortar. Small holes were bored partly through the masonry at the sides of the cracks, which spread in all directions, and the cement forced into the apertures. When this hardened, the stone was found to be thoroughly consolidated.

ELECTRIC FIRELESS-TYPE COOKERS

The successful experiment of cooking a pot of beans by the heat from an ordinary 16-cp. electric lamp, led a



Interior View of Two Types of Economical Electric Cookers



M. Gaumont Watching and Hearing Himself Make a Speech

Connecticut electric company to evolve two types of electric fireless cookers which take so little electricity that they may be connected directly to an ordinary electric-lamp socket without violating the electrical ordinances of any city or town in the country.

The cylindrical cooker has an outside diameter of 14 in., and an oven depth of 9 in. It takes the same amount of current as an ordinary 16-cp. carbon-filament lamp, and is designed mainly for stewing, boiling and long-hour service. The box-shaped cooker takes twice the current as the other, and is designed for short-time service, such as baking and roasting. It is said to meet the total cooking requirements of a family of from 3 to 5 persons. The outside box is of fiber. The two disk-heating elements, 6½ in. in diameter, are located at the top and bottom of an interior oven, 12½ by 10½ in. by 8 in. high, lined with glazed white fireclay and surrounded by asbestos packing. The large oven maintains a constant temperature of 380 deg. F.

An ordinary electric chafing dish takes 10 times the current required by the small cooker, and five times the current taken by the large cooker.

MOTION PICTURES MADE TO TALK

To sit at the rear of a hall and watch himself make a speech on the platform to a group of fellow scientists is the unique experience enjoyed by M. Gaumont, a French savant, at a recent meeting of the Academy of Sciences in Paris. M. Gaumont is the inventor of a synchronized motion picture-phonograph machine which he calls a "chronograph." It is the result of many experiments with motion pictures and talking machines and is said to be a perfect co-ordination of the two. In presenting the result of his labors to his associates, M. Gaumont adopted a method entirely out of the ordinary, but one which showed the capacity of the machine in a manner the reading of a long paper could never have done. He simply prepared his address and then caused pictures and phonographic records to be made of it with his machine. When it came time to present it to his audience, he darkened the room and let the machine speak for itself, projecting the pictures of himself on the screen while the talking machine gave simultaneously the details of the invention.



Three Successively Posed Photographs from Which the Single Moving-Picture Slide is Made

MOTION PICTURES WITH AN ORDINARY MAGIC LANTERN

Any magic lantern can be used to produce moving-picture illusions by adopting a special form of compound slide which was recently demonstrated in Chicago theaters. The principle is simple.

Suppose three equal-sized pictures (A, B and C) be cut up into a series of parallel equal strips. Take the first strip of each of the pictures and paste them next to each other, in order, on a piece of paper. Now take the second strip of each of the pictures and paste them in order next to the others, and so on until all of the strips are used up. It is evident that strips 1, 4, 7, 10, etc., on this compound picture belong to

picture A; strips 2, 5, 8, 11, etc., to B; and 3, 6, 9, 12, etc., to C.

Now take a piece of glass ruled in parallel lines a distance apart equal to the width of one of the picture strips. Leave the space between the first two lines transparent and blacken the next two spaces; leave the next (fourth) space transparent and blacken the next two; and so on.

If this glass be laid on the built-up picture, the transparent spaces will expose strips belonging to one picture (say A), while the black lines will cover the strips of the other two pictures (B and C). Now move the glass sideways to the left a distance



Left—The Screen; Middle—The Magic-Lantern Slide Made from the Three Pictures Seen Above; Right—The Slide with Screen Superposed to Cover Two of the Pictures.

The screen is actually much finer than appears in the cuts, which had to be "faked" for reproduction purposes. The general idea, however, is well conveyed by these pictures.

equal to the width of a strip. Strips belonging to pictures A and B will now be covered, and those of C will be exposed through the transparent strips of the glass. A similar further movement of the glass will expose B and cover C and A.

Of course the built-up picture will be three times the length of each of the component pictures. Suppose, now, that only every third strip of each picture had been selected, and the others thrown away. The resulting picture, built up in the same way as before, would be of the proper width. And when the glass screen were used as stated, the complete picture, A, B or C (according to the position of the black lines) would be exposed to view, the distance of the observer from the picture causing the separate strips to blend into one harmonious whole.

This, in brief, is the principle of the compound lantern slide. The transparency is made in the same way as the ordinary slide, except that, instead of one picture, three pictures of the same subject but of slightly different poses are used. The negative, from which the transparent slide is made, is exposed successively to the three pic-

tures, and instead of these being cut up into strips and rearranged, the same effect is produced by interposing a glass screen, ruled with black lines twice the thickness of the transparent spaces, between the picture and the negative plate. The screen is moved sideways through the width of a transparent space, between the first and second exposures, and again between the second and third. The result will be exactly the same as that of the cutting-up process previously described.

With this slide is used a ruled screen of the same size to cover up the strips of two of the pictures and expose those of the third. The slide and screen lie flat against each other, and the required movement is obtained by a small eccentric device, operated by a lever. This is secured at the end of an ordinary lantern-slide carrier.

When projected on the sheet, the effect of operating the lever is to cause one picture to dissolve almost instantaneously into the others, in turn. An illusion of motion is thus produced, which can be made very amusing. Pen-and-ink sketches may be substituted for posed photographs in making the slides.

FIGUREHEAD OF "IDAHO" ADORNS BANDSTAND

The bronze figurehead of the battleship "Idaho," which was ordered removed from the ship, has been sent to Boise, the capital of the state after which the ship was named, and it now surmounts a novel bandstand and speakers' platform built in the state capitol grounds.

The rostrum is built in the shape of the bow of a ship, and is constructed of concrete. The flagstaff which rises from the rear adds to the impression of a ship. A stone stairway leads to the top of the rostrum, and the inner edge of what would be the gunwale of the ship is equipped with cement benches.



Not a Ship, but a Bandstand

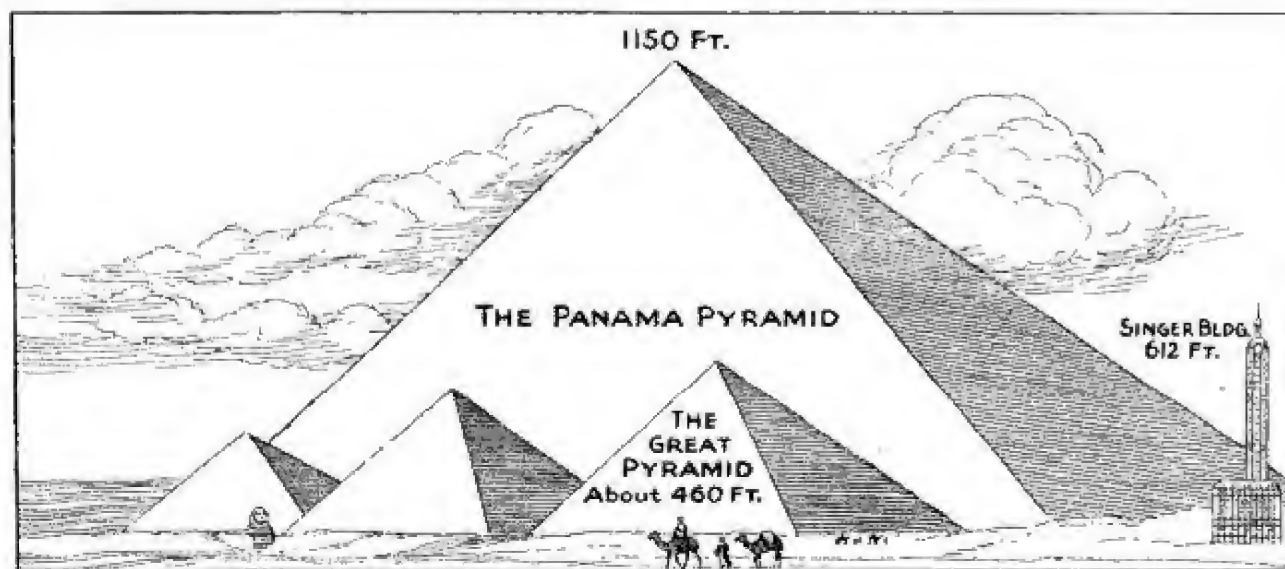
THE EXCAVATION OF THE PANAMA CANAL

The total amount of earth excavated and yet to be taken out in building the Panama Canal under the projected plans, amounts to 214,666,594 cu. yd. Such figures have no real meaning to the ordinary mind, unless they are compared to some existing objects the size of which can be comprehended by the eye.

Those persons fortunate enough to have taken the trip up the Nile, in Egypt, have marveled greatly at the immensity of the great pyramids.

city block. Assuming its base to be perfectly square, the "Panama Pyramid" would be three city blocks long, three blocks wide, and its height nearly twice that of the tower of the Singer Building in New York City.

If these figures are not startling enough, let it be supposed that the rock and earth excavated from the Panama Canal be loaded into 600-ft. steamers. About 30,000 such vessels would be required, and if stretched in line, end to end, they would form a



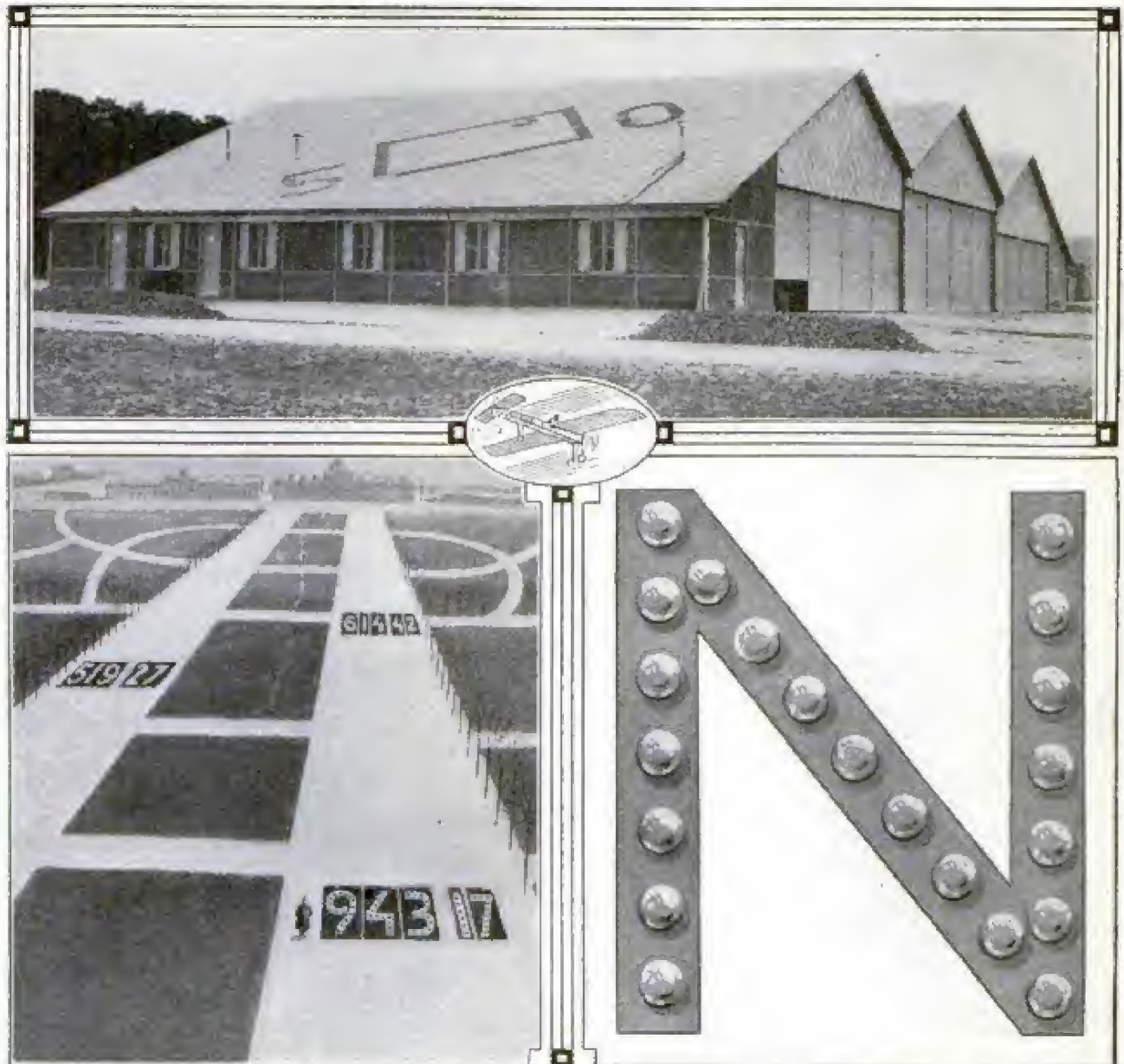
The Material Excavated in Building the Panama Canal, If It Were Consolidated in the Form of a Solid Pyramid, Would Make the Great Pyramids of Egypt Seem as Pygmies by Comparison, and the Largest Buildings of the Earth Look Like Dolls' Houses

And yet, if the rock and earth dug out in making the Panama Canal were to be built up in a solid pyramid, the proportions of the Great Pyramid, or Pyramid of Cheops, would seem insignificant in comparison. The "Panama Pyramid," as it may be called, would tower nearly $2\frac{1}{2}$ times as high as Cheops, and would contain about 14 times as much material, by volume. In height, it would extend up into the sky nearly 1,150 ft. The area covered by Cheops is slightly more than 13 acres. The "Panama Pyramid" would extend over nearly 75 acres. Taking the length of an average city block as 600 ft. and its width at the same figure, the "Panama Pyramid" would cover an area about 9 times that of a

bridge of boats extending clear across the Atlantic from New York to Liverpool.

Suppose again, that common dump carts such as used by contractors, were employed to carry away the dirt. Over one billion carts would be needed, and if they were strung out in line, they would extend no less than 160 times around the earth at the equator.

The journey from Paris to Tokyo will be shortened from 15 days to 11 days 10 hours by the opening of the new connecting line of the trans-siberian railroad from Mukden to Wiju, on the Korean coast, cutting out the trip to Vladivostok.



Silvered-Glass Balls Forming Figures

Military Markings on Building Roof

Letter "N" Formed of Glass Balls

DIRECTION SIGNS FOR AIRMEN

Much has been done recently in France in devising signs that can be seen by airmen and used as a means of direction or other information. Experiments carried on in Paris prove that silvered glass balls, set on a black background so as to form letters and figures, can easily be seen from a great height. One of the illustrations shows the figures 943 17 as photographed from a position 325 ft. above them on the Eiffel Tower.

A system of markings on the roofs of military hangars is being tested by the French Army with the idea of placing such markings on the roofs

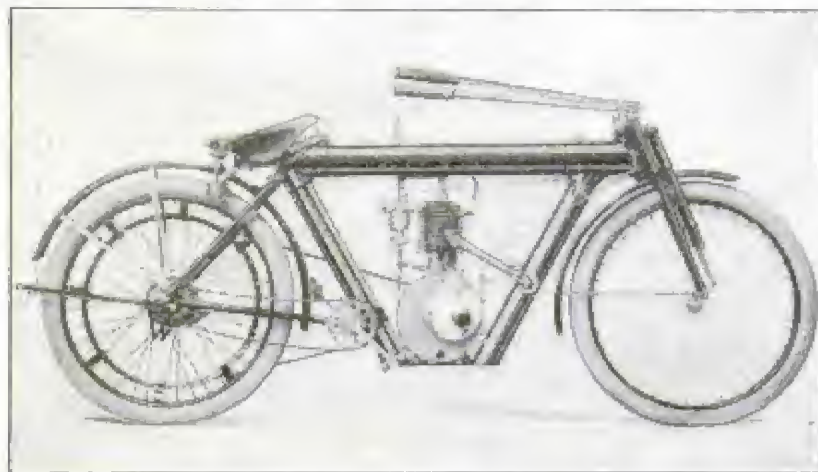
of buildings in all parts of France. The roof marking shown in the illustration would be unintelligible to the ordinary airman, but to the airmen of the French army, it would, through the medium of the military chart books provided them, show just what section of France they were over. In these chart books, France is divided into rectangular sections, each section bearing a number.

☞Telephoning from London to St. Petersburg, a distance of 850 miles, is to be made possible by means of the new cable across the English Channel, and suitable land lines.

MOTORCYCLE TUBING AS STORAGE SPACE

While motorcycles in general have the gasoline and lubricating oil tanks, ignition equipment, muffler and tool bags fastened onto the frame promi-

main frame. The tool kit is located under the saddle within the crossbar, the remainder of the space within this tubing containing the gasoline tank.



Ignition Equipment, Gasoline and Oil Tanks, Muffler and Tool Kit,
All within the Frame Tubing

cuously, wherever a convenient place be found, this motorcycle has all these important parts stowed away within the greatly enlarged tubing of the

placed within the same tubing as the muffler so that the heat could be utilized to make the oil flow easily in cold weather.

An emergency supply of gasoline is contained in a tubular tank in the upper part of the rear upright section of the frame, from which it can be pulled out by lifting the saddle, while the lower part of the rear upright section provides space for the batteries and coil. The lubricating oil tank is carried in the upper part of the front upright frame section, and the muffler is directly underneath. The oil tank was

DECLARATIVE ARCHITECTURE

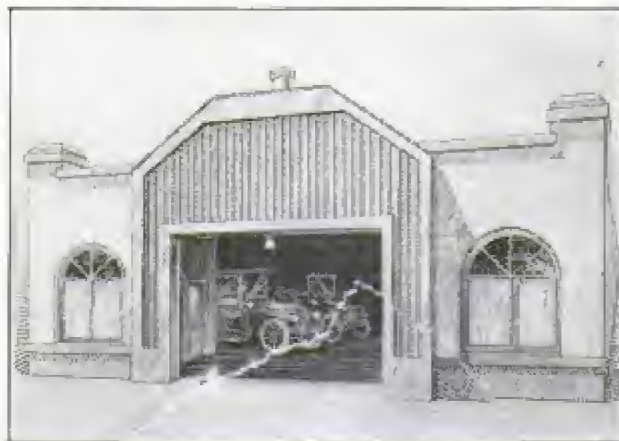
Two examples of architecture which suggest or declare the nature of the business they were constructed for are shown in the accompanying illustrations. One is a blacksmith shop at Glendive, Mont., and the other an automobile garage in San Jose, Cal. The doorway and windows of the former are horseshoe shaped, and the central

portion of the front of the latter is shaped to represent an automobile radiator.

A 150-ft. bridge spanning the Rio Michol River in Mexico is built entirely of solid mahogany, which at the present market price would bring nearly \$2,000,000.



The Architecture of This Building Explains Its Purpose



Shaped Like the Front of an Automobile



Capt. Brodie Walking Along a Road While Clothed in "Death Costume" and Preaching as "A Voice from the Dead"

WEARS SKULL WHEN PREACHING OF DEATH

Assuming that people forget what they hear, but remember what they see, Captain Brodie of the Salvation Army in London, wears a skull and shroud when preaching of death. His aim is to impress people into thinking about death and what follows it.

SHOOTS SELF RATHER THAN BURN

John Whitelaw, an express messenger on a Grand Trunk passenger train, caught in a recent wreck near Paris, Ont., chose death by bullet as preferable to being roasted alive. Pinned under one of the cars in such position that the rescuers were unable to free him, he watched the approach of the fire in the debris until all hope of its being extinguished was past, then shot himself through the breast with his revolver.

GYROSCOPE FOR MOTION-PICTURE CAMERAS

A French inventor has designed a gyroscope attachment for motion-picture cameras, the purpose of which is to neutralize the short and rapid shocks the apparatus is subjected to when not steadily supported. The slower shocks caused by turning the crank by hand are done away with by substituting a small compressed-air motor for this purpose.

The ordinary motion-picture camera must be mounted on a steady tripod, if the negatives are to be sharply defined. This takes time and is a handicap, if the scene to be photographed happens to be something which develops suddenly, such as the fall of an aeroplane. By use of the gyroscope and compressed-air motor, it is claimed to be possible to make clear, distinct motion pictures by simply holding the apparatus in the hands, as in making snap-shots with an ordinary camera.

HIDDEN PUFF-BOXES

A new fad for women is a secret puff-box in an umbrella handle, hat-pin head or pendant and watch brace-



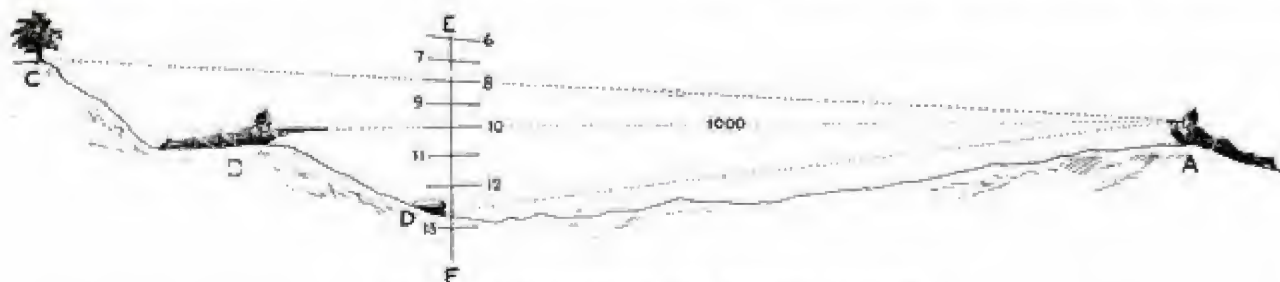
Puff-Box in an Umbrella Handle

lets. Many of the umbrella handles have a compartment into which a tube of lip salve may also be slipped, while tiny jeweled enamel puff-boxes, costing as high as \$50, are now often attached to snap-spring bracelets in place of the usual locket or padlock. On the watch bracelet the puff-box is hidden under the watch.

in command to give his men the range at which they should set the rear sight of their rifles in order to effectively fire on an enemy, which, for some reason or other, cannot be seen with the naked eye.

It consists simply of a glass plate, on which is a scale graduated to correspond with the scale on the rear sight of the rifles. This plate forms part of the left ocular in the field glass, and the scale, the lines and numerals of which indicate the distance, appears enlarged in the field of vision when the field glass is used.

An excellent idea of how the device operates may be gained by referring to the accompanying drawing. The officer using the field glass is represented as A, and B is the enemy's firing line. The distance between the two firing lines is known to be, say, 1,000 yd., but, because of faint light, mist or some such reason, the men cannot see the enemy. The officer, using the field glass, sees the enemy, however, and levels the glass until the line marked 10, the enlarged image of which is represented in the drawing by E F, is in line with B. Although, as before stated, the enemy cannot be seen by the men, some larger object in the line of fire, either in front of and below the enemy's line, as D, or back of and above it, as C, is probably clearly visible. When the field glass is leveled



Aiming at One Object and Striking Another

FINDING FIRING RANGE WITH BINOCULAR DEVICE

While not a range-finder in the usual meaning of the word, the little device for binoculars, invented by an officer in the German army, may be properly called so, because it enables the officer

so that the line 10 in the field of vision is in direct line with the enemy, the object C, which in this instance is back of and above the enemy, coincides with the line of the scale marked 8. Consequently, the officer orders his men to adjust the sights to 800 yd. and aim at the object C. Similarly, if D is

determined on as the object to be aimed at, the officer orders the sights adjusted to 1,250 yd., as the object D is midway between the lines numbered 12 and 13 on the scale. In either case, although not aiming directly at the enemy, the fire would be effective at 1,000 yd.

EUROPE TO SOUTH AMERICA SHORT ROUTE

European capitalists are projecting a rail and water line between Europe and South America that will mean a reduction of seven days in time from Mediterranean ports, and more in proportion from northern ports.

The plan is for a railroad to be known as the "Ibero-Afro-American Railway," crossing Spain and down the African west coast from Tangier to Bathurst, Gambia, the point in Africa nearest to South America. Huge ferryboats will transport the trains from Gibraltar to the African coast in half an hour, and the run from Tangier to Bathurst or Dakar will take but two days. The voyage across the Atlantic from Africa to Pernambuco, Brazil, by fast steamers would take but three



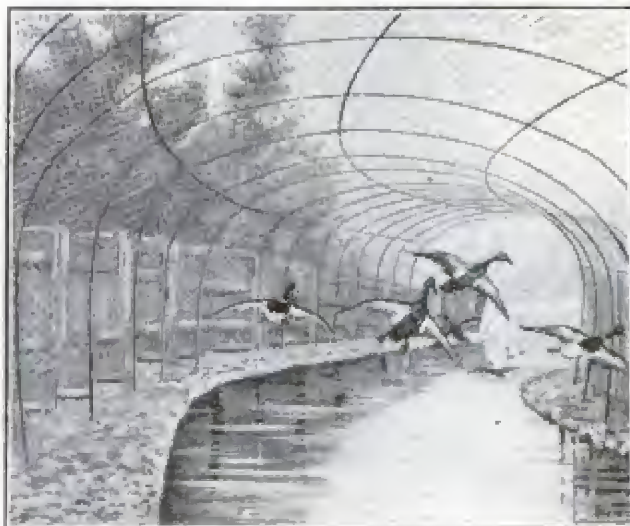
Proposed Rail and Water Route from Europe to South America

days, which would bring Europe within five days of South America. The distance across is a little more than 1,600 miles. It is estimated that the project will require a capital of \$140,000,000.

ENGLISH DUCK TRAP

A remarkable trap and decoy is used at Hornsby castle, on the Duke of Leeds' estate, England, to capture wild

duck. Tame ducks are kept in the small lake on the estate to entice the wild ducks when the frosty weather



Courtesy Black and White, London
The Wired-Over Outlet



Narrow End Where Ducks Are Captured

arrives, and these, incited by a trained dog, lead the wild visitors into a net-covered outlet from which there is no escape.

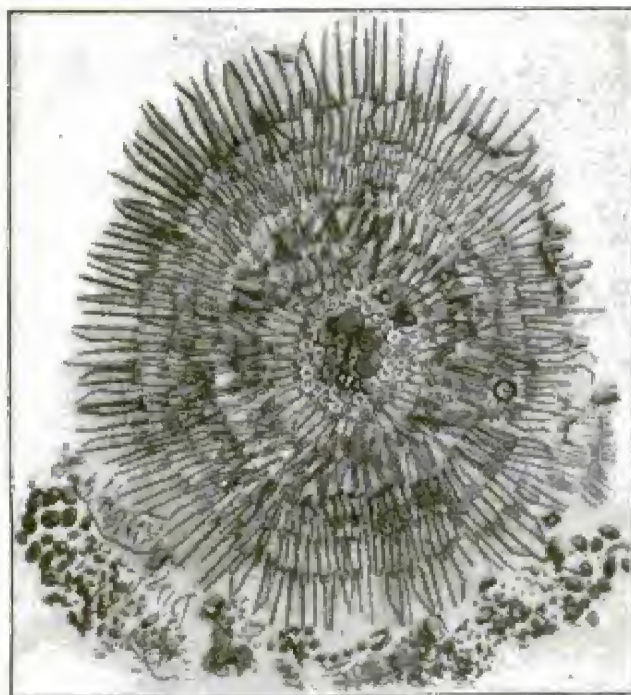
The trap, composed of wire netting stretched over an arch-shaped metal skeleton, covers the outlet completely over, and then narrows down to the end in which the ducks are finally caught.

The part played by the dog, which

the ducks mistake for a fox, consists of jumping back and forth over specially-constructed screens at the side of the arch. This action infuriates the ducks, which collect together and endeavor to quack him off their preserve. As the ducks advance the dog retreats, luring them farther and farther into the net, until finally a screen is lowered behind the birds. They are then driven into the narrow end.

WOMAN SWALLOWS FIVE POUNDS OF HARDWARE

Examination of the stomach of an insane woman who died in the state hospital at St. Joseph, Mo., recently,



Nearly 1,500 Articles and Fragments of Hardware Found in Stomach of Insane Woman

divulged the fact that during the several years of her detention she had swallowed 1,446 articles and fragments of hardware. Instances of insane persons swallowing foreign substances are common, but this case is remarkable, because of the number and variety of the articles, and the fact that there had never been any symptoms suggesting trouble with the stomach.

The list of articles found includes 453 nails, ranging in size from 3-penny to 20-penny; 42 screws, 9 bolts, 5

teaspoon handles, a nail file $3\frac{1}{2}$ in. long, 5 thimbles, 3 salt-shaker tops, 115 safety pins, 52 hairpins, 136 common pins, 7 broken coat-rack hooks, a string of beads 4 ft. long, 85 large beads, and 742 miscellaneous objects.

NEW PROPULSION SCHEME FOR SHIPS

Two Brooklyn inventors have been issued patents on a scheme for vessel propulsion which they claim will make possible the control of the engines from the bridge and automatic mechanical steering. The system of pilot-house control of the propelling apparatus is secured through the combining of electric motors with kerosene engines, and the automatic mechanical steering by means of an electrically connected compass.

The inventors claim that all the operator in the pilot-house will have to do will be to map out and start the vessel on a course, after which the machinery will do the rest. As soon as wind or wave throws the vessel from her course, the compass box, turned around the north-pointing needle by the falling away of the ship, makes an electrical connection which starts the propeller on one side revolving faster than the one on the other. This, so the inventors presume, will drive the ship back to her course in a few seconds, after the accomplishing of which, both the port and starboard propellers will be revolved at the same speed again.



Some 200 Persons Will Have All the Comfort and Luxury of a Fine Estate in This French Communistic Dwelling at a Nominal Cost

COMMUNISTIC DWELLINGS ON LUXURIOUS SCALE

Plans have been made for the erection near Paris of a luxurious communistic or cooperative dwelling in which a large number of people of the same class may live in common without infringing upon each other's individual liberty, and with a degree of comfort and luxury that could not be realized for the same amount of money if they lived separately.

The historical old estate, "Chateau des Mesnuls," near Paris, with its century-old parks and gardens, fish ponds and rolling meadows, comprising in all some 170 acres, has been acquired by the association. The old mansion will be left undisturbed for the accommodation of visitors and tourists, and the communistic dwelling will be erected facing it on a sloping green of about 12½ acres in extent. It will be built in villa style, and will consist of two wings, composed of 100 two-story residences, which are joined by a pergola-like gallery in 15th-century Florentine style. Each residence has

a private garden. The communistic features include dining rooms with common or private tables, large and small drawing rooms, smoking and billiard rooms, a lecture hall and library, Roman baths, and a winter garden.

Each residence is intended for only two persons, without restriction as to age, or for a family consisting of husband and wife and one child. Provision is made in each residence, however, for a man servant or maid, or both, a small additional monthly fee being exacted for each of them.

The grounds are, of course, at the disposal of all, with what hunting and fishing there is, as well as gardening. An automobile service, and medical attendance are also provided, all of which a single tenant may enjoy, along with his private residence, telephone, meals at a common or private table, light, heat, laundry, etc., for the modest sum of about \$1,200 a year. For two persons the cost would be about \$1,800.

PLAYING CHECKERS ON A 24-FOOT BOARD

Lawn checkers is the newest game to be introduced in public playgrounds and recreation centers. Old-fashioned checkers has long been a popular game in the settlement houses and the social centers and lawn checkers is played in exactly the same manner, so far as the moves and general characteristics are

with a hook in the end. The game does not drag like an ordinary game of checkers, as the player is allowed only 30 sec. for each move. Several of the large hotels at fashionable summer resorts have ordered lawn checker boards, and will have them installed in the early spring.



Playing "Lawn" Checkers in New York. Christy Matthewson, Baseball Star, at Right

concerned. Instead of a small board that can be held in the lap of the players, however, the lawn game is played on a marked-off space, 24 ft. square, the "board" being made of white canvas, on which squares are cut out to represent the black or red squares on the regulation board.

The feature of the game that has appealed most strongly is that it can be transferred out-of-doors as the days grow a little warmer, and will have the additional advantage of keeping the boys in the open air. The players walk in the blank or cutout squares, moving their men, which are made of papier maché, by means of a long cue,

SHIPPING SNOW SOUTH

To ship snow to the south as a means of ridding a city of part of an unwelcome surplus seems an extraordinary procedure, yet this was done in Chicago following a February blizzard. The Illinois Central Railroad, whose tracks run along the lake front, was badly snowed under. A large number of empty coal cars about to start for Kentucky coal mines being on hand, the snow was shoveled into them. The snow was nearly all melted by the time the trains reached the Kentucky coal fields, and the cars were loaded with coal and hauled back to Chicago.



Crews of British Submarines in Safety Drill

SAFETY HELMET DRILL ON BRITISH SUBMARINES

The crews of the British submarines are as steadily drilled in preparation to save themselves should accident occur as are life-saving crews in preparation for the saving of others. The illustration shows the ending of a competition between the crews of two submarines. The men were at work at their respective posts when the lights were put out and the order "on helmets" was given. Only 3 min. 5 sec. elapsed before the crew of the winning boat was on deck.

ELECTRICAL HANDLING OF MAIL

The handling of mails between the sub-postoffice and the trains in the new Pennsylvania Railroad Station, New York, is by a unique electrically-operated plant, capable of receiving and delivering 300 tons of mail a day. Overhead and underground belt conveyors, chutes, slides and elevators of the plunger, platform and bucket types, are employed for transporting the pouches between the different floors of the sub-postoffice building and to the mail trains standing on the sunken

tracks, some of the conveyors delivering directly into the mail cars.

The illustration shows one of the continuously moving belt conveyors delivering pouches through chutes into the very door of a car.



Electric Overhead Carrier Delivering Mail into Car in Pennsylvania Station, New York

INTERESTING STREET-CAR SEATING ARRANGEMENT

Up to the present there have been two distinct arrangements of seats in inclosed street cars, one consisting of



Ingenious Seating Arrangement of Pittsburg Street Car

two continuous bench seats on each side of the car, and the other of cross seats with side seats at the ends, the latter varying in length according to the number of cross seats. In this steel street car built in Pittsburg, there is a continuous bench seat on one side and cross seats on the other, which provides an exceptionally wide aisle.

NEW SOURCE OF RUBBER

A new source of rubber supply was announced at a recent session of the French Academy of Sciences, the scientist responsible for the announcement demonstrating that rubber can be extracted in commercial quantities from a gum found in abundance on the Malay Peninsula and the islands of the Malay Archipelago. The gum, which can be easily gathered, contains from 10 to 20 per cent of pure rubber.

SAFETY SIGNAL FOR LOCOMOTIVE CABS

Of several systems of automatic safety signals designed to prevent accidents through the disregard of stop signals by locomotive engineers, the best results in recent German Railway tests were obtained by a recording alarm. By means of electric contact, a bell in the locomotive cab is rung, if a stop signal is overrun. This notifies the engineer that he is disregarding the signal, and also gives evidence against him, as the bell cannot be stopped without recording the overrunning.

WORM'S-EYE-VIEW OF A LONDON STEEPLE

The bird's-eye-view of a thing is quite a common form of illustrating, but few people have given thought to what a worm's-eye-view would be like. A London photographer evidently had this in mind when he made a picture of a couple of steeplejacks at work on the top of a tall church spire in the English capital. He pointed his camera straight up the center of the tower or steeple, calling on the workmen he could plainly see through a round aperture in the peak, to look down.



Courtesy the Sphere, London
Looking Up through a Church Steeple



Ingenious Pneumatic Plant Used in Germany for the Mechanical Tamping of Paving Blocks

PNEUMATIC PAVING-BLOCK TAMPER

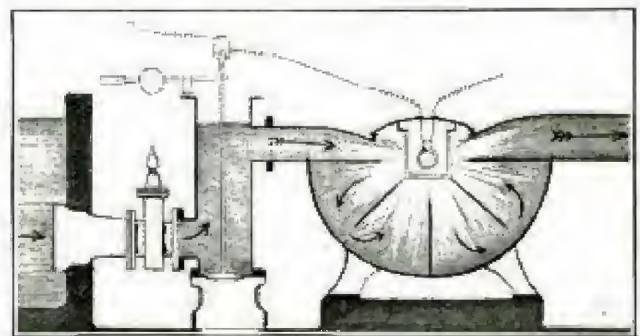
Pneumatic tampers of ingenious design are being used in laying block pavements in Germany. The compressed air is supplied by a portable plant, and several leads of hose and tampers may be used at once. Running centrally through the tamper is a rod or standard, which is rested on the block being tamped, and on which the tamping head and pneumatic mechanism work up and down in delivering the blows.

WATER STERILIZATION BY ULTRA-VIOLET RAYS

An apparatus in which ultra-violet rays are utilized for sterilizing water is in operation in France. The lamp is placed in a watertight rectangular box, the three submerged sides of which are composed of quartz plates. In one of the tests, one lamp was used steadily day and night for 12 days, sterilizing 6,600 gal. of water per hour.

The location of the lamp is shown in the accompanying drawing, as well

as an automatic safety valve which causes the water to flow out through a drain pipe, instead of passing through the apparatus, should the lamp go out. Bacteriological examinations show that



Purifying Water by Light Rays

the filtered water sterilized by the apparatus contains from 500 to 13,000 germs per cubic inch before treated by the ultra-violet rays, as compared to an average of about 17 per cubic inch after treatment.

¶The first war vessel to be built in Venezuela was launched recently in the government navy yard, the ship being a gunboat of 61½ tons which has been christened "29 de Enero" ("29 of January") because that is the day the vessel's keel was laid.

TRICYCLE-CARTS FOR STREET CLEANERS

A new street-cleaning service has been inaugurated in Paris for the pur-



Keeping Paris Streets Free of Waste Paper

pose of keeping the boulevards and streets free from the litter of handbills and torn paper which has long given them the reputation of being the Parisians' waste-paper basket. The waste-paper gatherers will ride the streets on tricycles of the type used for the delivery of packages. The scraps of paper are picked up on spiked sticks and dropped into ordinary waste-paper baskets carried by the gatherers. When the basket becomes full, its contents are deposited in the box carried by the tricycle.

U. S. HAS TIMBER TO HOUSE A BILLION PEOPLE

The United States has enough standing timber to build frame houses for about a billion people, or two-thirds of the entire population of the world.

This fact is immediately deducible from figures given in the recent report of Herbert Knox Smith, commissioner

of corporations, on the lumber industry of this country.

There are, in the forests of the United States, about 2,800 billions of board-feet of timber, a board-foot being equal to a slab 1 sq. ft. in area and 1 in. thick. Sawed into lumber and placed in freight cars, it would load a train nearly a million miles long. Cut into blocks 4 in. thick and used as a paving material, it would provide wood paving for three million miles of roadway having a width of 50 ft., or it would make a road over a mile wide around the earth at the equator.

CONVEYOR USED IN LOADING "MAURETANIA"

This automatic, electrically driven conveyor is used in loading and unloading the "Mauretania" and "Lusitania." The motors are located inside the steel frame, and the wiring extends from end to end, which makes possible the placing of push buttons at various distances, so that the motors may be started or stopped at any point.

The endless carrier moves at a speed of from 75 to 100 ft. per minute, can handle 3,000 pieces of freight per hour, and is operated easily at any angle up to 45 deg.



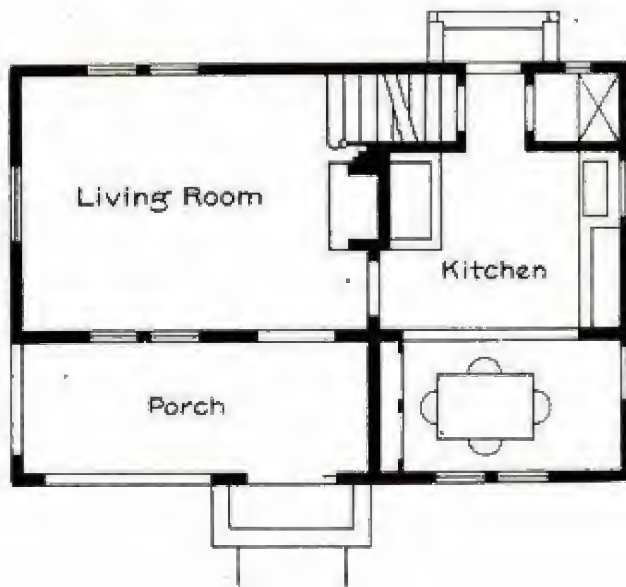
Electric Endless Carrier for Loading Ships

PRIZE-WINNING DESIGN FOR SMALL HOUSE

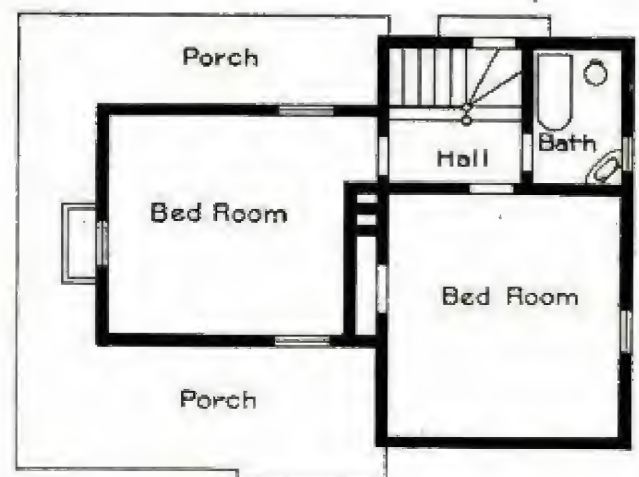
SIMPLICITY is the keynote in this plan for a 4-room tile-block house to cost not more than \$2,500. The outside is to be finished with a coat of cement. The floor beams are to be wood and there is to be shingle or slate roof. The exterior trim on the window frames is to be stained dark brown. This design won a prize at the recent contest for small house designs conducted by the Building Trades Employers' Association of New York.



Front Elevation Showing Excellent Lines and Economy of Material



First Floor Plan



Second Floor Plan

Designed by Robert L. Stevenson, Architect

WIRELESS ANTENNA USED IN AEROPLANES

Two methods of disposing of the antenna have been adopted by the military and aviation experts in working out the wireless problem with the aeroplane. The military officers who recently completed successful tests on the Pacific coast are credited with the most simple device. The great problem has been to provide a proper antenna for the aeroplane end of the circuit and the army officers do this with a strand of copper wire 200 ft. long. A coil of

fine copper wire is taken aloft and is allowed to dangle toward the ground. The experiments that have been made with this system have all been at an altitude that permitted a length of wire of 200 ft. When the experiments were completed, the wire was simply cut and allowed to fall. This class of wire is cheap and is used for a variety of purposes in military operations so that a plentiful stock of it is always at hand.

The second method, which has been



Two of the Types of Aeroplane Wireless Apparatus with Copper Wire Antenna, Used by Army Officers

successfully tested by wireless and aviation experts, consists of connecting all the wire stays of the aeroplane in series to form the antenna. On one machine that was fitted in this manner, the aggregate length of the antenna thus obtained was 800 ft. and so well did it work that messages from shore stations around the city and even from ships at sea were received on the aeroplane instrument while the latter was in a shop on the first floor of the building of the United States Aeronautic Reserve in New York, although the

wires were not connected with other antennas on the roof of the building.

There have been several types of equipment devised for aeroplane use. Photographs of the experiments made in San Francisco show two army officers each using a different type. The one which was installed in the machine that has been set up by the New York reservists has a total weight of 65 lb. This has a 6-in. spark coil which is fed by a 12-volt storage battery having a capacity of 50 ampere-hours and weighing only 40 lb.

FRANCE INTERESTED IN WRIGHTS' SUIT

The proceedings in the suit brought by the Wrights against French aeroplane constructors for alleged infringement of patent rights have been followed with considerable interest in France. The basis of the suit is the contention that the Wright patents cover the simultaneous action of warping the wings and changing the angle of the vertical rudder to establish equilibrium, the construction details for which, more or less modified, are used in all flying machines. Conse-

quently the Wrights claim the right to issue licenses, which means that the Wright patents may become in aviation what the Selden patents were in the development of the automobile.

The attorneys for the defense reviewed the development of the aeroplane at the first hearing and argued that the warping of the planes had been utilized in earlier machines, and that the selfsame word, "warping," was used in the Adler patents of 1900 relative to the flying machine "L'Avion."

It was also argued that the vertical rudder could not be patented, having been in use in aerial navigation long before the Wrights appeared, not to speak of its use on ships. The combination of the two in simultaneous action is performed by the airman as he sees fit and as circumstances require. Therefore the defense maintains that the combined action of the two is not patentable.

MAIL CARRIERS USE AUTOS IN THE WEST

The automobile is putting the old stage lines in New Mexico and Arizona out of business for the carriage of mail to points inaccessible to the railroads. The motorists on the "star" and the rural-free-delivery routes have troubles out of the ken of the ordinary automobile drivers, however. The cars cannot be driven along some of the trails that are easily covered by a horse and wagon, and in some places bridges with troughs for the wheels of the machine instead of a full width of flooring are built over old creek beds and depressions. At other points, where fence lines must be low, bridges that are really cattle guards are laid a distance of a few feet on either side of the fence line where a section has been removed. These are made of boards set on edge and are provided with narrow strips on which the automobile can run, but over which cattle cannot pass.



Bridge over a Creek Bed in New Mexico with Troughs for Wheels of Automobile Mail Carrier

PLAGUE-PROOF GARMENTS

The illustration shows the means adopted by physicians to prevent infection of the plague which has been devastating Manchuria and parts of China. The helmet, coat and gloves are of rubber, and the helmet is soaked with iodoform.



¶The first evidence of the aeroplane interrupting the course of true love was recorded in the English newspapers when a announcement of the dissolving of her engagement to marry Robert Lorraine, the actor-airman, was published by Marie Lohr, an actress, the determination of her fiancé to continue flying being given as the cause.

¶Lieutenant Stein of the German military aviation corps, was instantly killed when the aeroplane he was testing at Doeberitz, Feb. 6, fell 65 ft.



Fence Crossing and Cattle Guard Used in New Mexico for Automobiles in Use on Mail Routes

TROUSERS SKIRT DEVISED FOR OUTDOOR WEAR



The American Interpretation of the French
Trousers Skirt

The trousers skirt that has created such a sensation within this country and abroad was designed primarily for out-of-door use. The basic idea, which came from one of the most famous of the Paris dress-making establishments, was to give woman a garment in which she could be comfortable while in the open. It was meant for touring, for walking expeditions, for hunting and other such purposes, and was not at first intended to be used in the drawing room or on the streets for morning or afternoon wear, as the so-called harem skirt has come to be used. American dressmakers have remodeled the garment into more practical form than the original Paris design and have so made it that it can even be equipped with hip pockets, if the fair wearer so desires.

¶The capacity of the aeroplane as a means of taking the family for an outing was tested with success by Charles F. Walsh of San Diego, California, who made a flight at Los Angeles with his wife and two children as passengers.

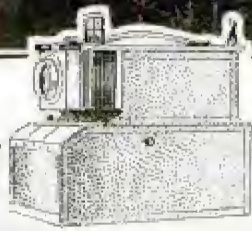
LONG-DISTANCE CAMERA

For the photography of inaccessible objects, such as mountain views, details of architecture, and scenes which must necessarily be a considerable distance from the operator, such as movements in modern warfare, ordinary photographic apparatus is inefficient. An ordinary camera provided with a lens of 48-in. focus would give a sufficiently large image under such conditions, but weight, volume and excessive length make such an apparatus impracticable.

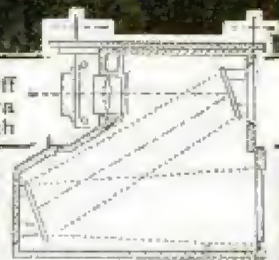
A long-distance camera has been designed, however, which provides a focal length of 48 in. with a length of but 16 in. of apparatus. This is accomplished by breaking the focal length

into thirds with the aid of two mirrors, as shown in the diagram. When the camera is not in use, the upper part telescopes into the lower.

The accompanying illustrations of a mountain scene in Switzerland, one photograph taken with an ordinary camera, and the other with the long-distance apparatus, from exactly the same spot, provide an excellent comparison. The photograph taken with the ordinary camera has a section marked off at the right, the buildings in this section being about 1,400 ft. distant. The second illustration shows the section marked off in the first as brought out by the long-distance camera.



Taken with the Ordinary Camera, the Section Marked Off Being 1,400 Ft. Away. Exterior Appearance of Camera and Diagram Showing Method of Breaking Focal Length



Details within Marked Section of Photograph Reproduced Above as Brought Out by Long-Distance Camera from the Same Point



1—Cavendish Morton before Starting to Make Up for the Part of Falstaff

2—The Start—Wig and Bulging Forehead with Eyebrows in Place

3—The Silk Bag in Place, Ready for Inflation

A SILK BAG FOR FACIAL MAKE-UP

By WENDELL PHILLIPS DODGE

Cavendish Morton, a young actor, is the inventor of a unique appliance for making up for rôles calling for a "big head." It consists principally of an ingeniously made silk bag having a drawstring for controlling the amount of inflation.

In pondering over how he could "get into" the part of Falstaff, physically as well as histrionically, he hit upon this scheme of ballooning his own face and head to the full-moon size of that of Shakespeare's elephantine, yet withal witty creation.

The six accompanying illustrations make clear how the trick of "getting the big head" is done. Figure 1 shows Mr. Morton, who weighs 180 lb., before entering his dressing room, where he proceeds to build himself into the proportions of the 400-lb. Falstaff.

In Fig. 2 is seen the wig in place which is to be used with the "big head." This consists of a sort of silk bag inflated before it is put on. Usually, a padded wig is worn, but poor old Falstaff easily gets hot-headed, so Mr. Morton devised his silk bag, inflated with cooled air, to take the place of a cake of ice on the head for that "morn-

ing after" feeling that Falstaff experiences after his ineffectual flirtation with the Mistresses Ford and Page.

Figure 3 shows the silk face bag joined to the wig and "big head," on which the full-moon cheeks and double chin are to be formed. The edges of the silk bag are joined around the eyes, mouth and nose with spirit gum. Next the cheeks and chin are padded by carefully pulling the drawstring. The silk make-up bag then takes the appearance shown in Fig. 4.

Pouches of nose paste are now placed beneath the eyes, and these are blended with the false cheeks, effectually covering the joints. Then a groundwork of No. 3 grease paint, made deeper with yellow, carmine and a little lake, is applied evenly all over the face. Blotches of carmine mixed with a little yellow are dabbed on the nose and cheeks, and the high lights of white, mixed with a little yellow, are placed on the forehead, on the pouches under the eyes, and on the cheeks. These are then carefully blended with the groundwork. (See Fig. 5). All is now ready for the beard and mustache of the jovial and rotund knight. These are so placed on



4—Bag Tightened at Bottom and Inflated

5—The Nose of Toupee-Paste in Place. Now for the Complexion

6—Sir John Falstaff—One of the Most Difficult Make-Ups Ever Devised

the balloon-mask that the actual outlines of the cheeks are lost. The beard is then blended into the cheeks with fine pieces of crêpe hair stuck on with spirit gum. Finally, the eyelashes are colored with a reddish yellow, making

the eyes seem smaller, and, consequently, giving an added appearance of great breadth, or rather circumference, to the face of the character. The complete head and face appear in the play as in Fig. 6.

ANOTHER SLIDE IN PANAMA CANAL

One of the worst slides the Panama Canal engineers have had to contend with occurred in February, when 500,000 cu. yd. of earth slid into the cut just opposite the town of Culebra. It has always been held that the slides were caused by heavy rainfalls, which make the soil soggy and the sloping rock underneath slippery. Under this condition it is believed that when the weight overcame adhesion and when the concussion of dynamite blasts gave sufficient impetus, the slides took place. It is said that no such explanation is possible for this slide, because there had been no heavy rains in the section for six weeks and no blasting in the vicinity.

☞ Maurice Tabuteau has been awarded the Michelin trophy for 1910, his record showing a continuous flight of 7 hr. 45 min. covering a distance of 362.7 miles.

LIGHT FLASH COMBINED WITH WHISTLE BLAST

Several vessels on the Great Lakes are being equipped with an electric whistle-blowing apparatus that will cause a light to flash at the same time, and for the same duration, as the whistle blast. The light, of course, is only brought into play at night, and its purpose is to make it possible for one ship to signal another by visual means as well as by making a noise.

Vessels are continually passing each other at close range on the Great Lakes, especially in the channels connecting them, and when steaming into the face of a high wind, there is a possibility that the sound of the whistle will not reach an approaching vessel. Such a contingency is provided for in the daytime by locating the whistles at least 4 ft. higher than the top of the pilot house, so that the escaping steam will show that the whistle has been blown and tell whether it was a long or a short blast.

ELECTRICITY PRODUCED BY OIL-GAS POWER

The Holton Power Company of El Centro, Cal., is to generate electricity by means of gas power derived from crude oil, the success of which, it is believed, will greatly affect the means employed for producing power in sections of the country where fuel oils are available and where water cannot be obtained in sufficient quantity for use in steam plants.

The new plant consists of three oil-gas producers, which burn a small amount of the oil and convert the rest into a power gas suitable as fuel for a gas engine. On leaving the producer, the gas goes direct to a 1,000-hp. twin-tandem gas engine, which is direct-connected to a 3-phase, 60-cycle, 2,400-volt alternator.

RECORD AEROPLANE FLIGHT WITH PASSENGER

The French airman, M. Busson, recently broke the world's speed record for flight with a passenger by flying $29\frac{3}{4}$ miles in 30 min. 36 sec. at Rheims, which corresponds to a speed of 58.4 miles an hour. The flight was made in a Deperdussin military monoplane, and the course was a circuit only $1\frac{1}{2}$ miles in length, which necessitated much skill and care in maneuvering.

CA special train carrying Charles G. Gates from Yuma, Arizona, to New York for medical attention, covered the last lap of the journey between Chicago and New York, a distance of 974 miles, in exactly 987 minutes, the fastest time of record for the distance.

SAFETY APPLIANCE TO STOP DERAILED TRAINS AUTOMATICALLY

By C. S. PARTRIDGE

By driving a train over broken rails on a leased track near Washington, D. C., every afternoon, J. T. Andrew, an Alabama railroad man is endeavoring to convince government officials that his safety appliance will prevent the derailment of railway locomotives and cars from any other cause than the deliberately wicked machinations of man.

The invention is simple. It consists of two extra wheels, two rollers, a valve operating the emergency brakes, and a tie-beam to prevent the falling of the brake-beam, should it happen to break. The extra wheels are of smaller diameter than the regular wheels and are attached to the axle by a case bolted to the axle; the extra wheels, with heavy double flanges and faces of 12 in., fitting just inside the regular wheels. The rollers, also of 12-in. face, are immovable, being attached to the journals just outside the regular wheels. The case strengthens the axle

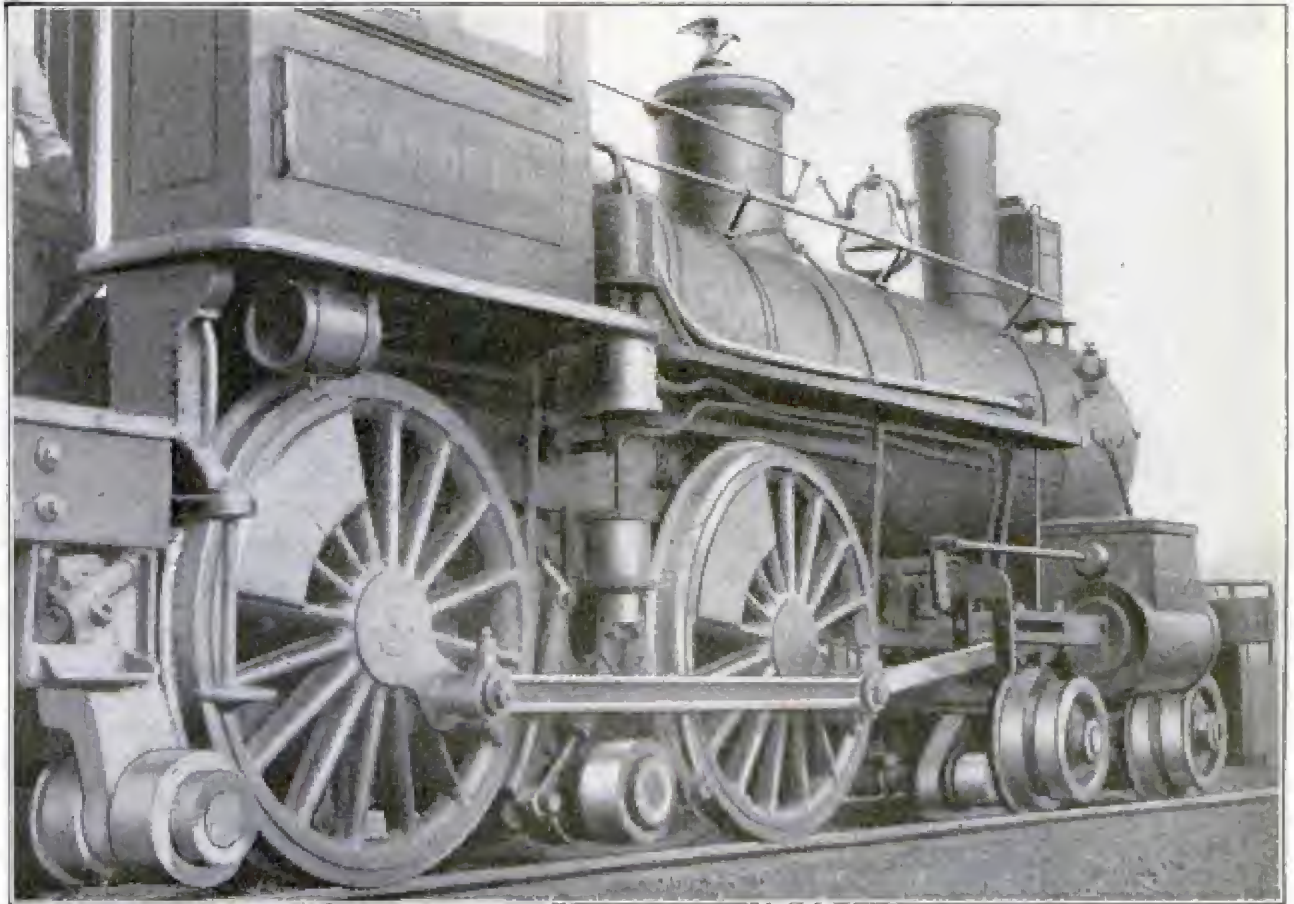
and prevents damage if it should break. The rollers, when in use, distribute the weight of the car on the trucks.

The tie-beam, besides affording a protection against a broken brake-beam, binds the trucks together more firmly.

The valve operating the emergency air brakes and signaling the engineer is worked by a rod which is moved upward by the roller when it takes the rail.

The principle on which it works is that when one regular wheel or several regular wheels leave the rails, the rollers on one side and the extra wheels on the other take the rails and stop the train by automatically applying the brakes.

The most severe test in derailments from "natural causes" is that of causing a break in the track by the removal of a portion of rail. Into and over such a gap the locomotive and car equipped



Locomotive Fitted with Safety Appliance

with the appliance have been driven at a speed exceeding 40 miles an hour. In all the tests made in Washington and in the South—more than 150—no person has been injured and no property damaged, the cars being unhurt.

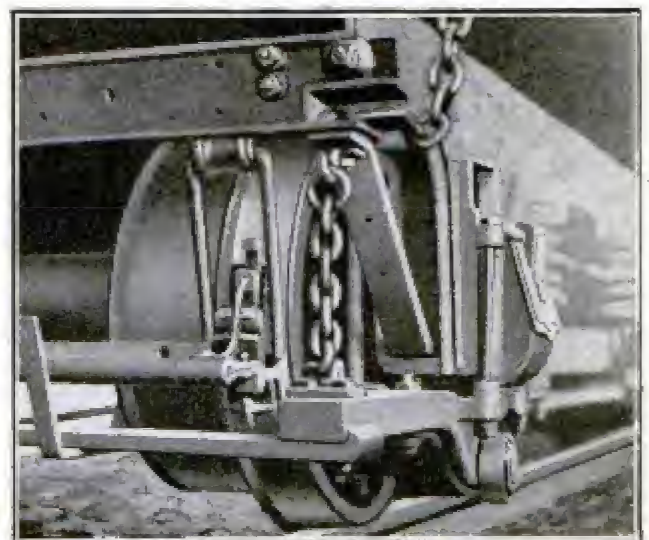
In the tests, the emergency brakes were automatically and instantaneously applied and the train was stopped within 175 ft. Rerailers were

placed, another locomotive hooked on, and within a minute the train was humming along under its own power.

AN American shipbuilding firm has been awarded the contract for the construction of a second-class cruiser for the Chinese navy, at a cost of \$1,000,000. This is the first Chinese warship to be constructed in America.



Engine After Wheels Have Left Rails, Showing How Appliance Holds Locomotive on the Other Side



Appliance Attached to Trucks of Car. The Tie Beam is Parallel and Below the Brake-Beam

PLIERS AVERT DANGERS OF LONG HATPINS

While pliers are not usually rated among the weapons of defense there is every prospect that the useful tool will be so set down in the future be-



Pliers Effective Protection Against Hatpins

cause of the effective use to which they have been put to guard against damage from hatpins in crowded street cars. A Chicago architect is credited with having first made use of a pair of pliers

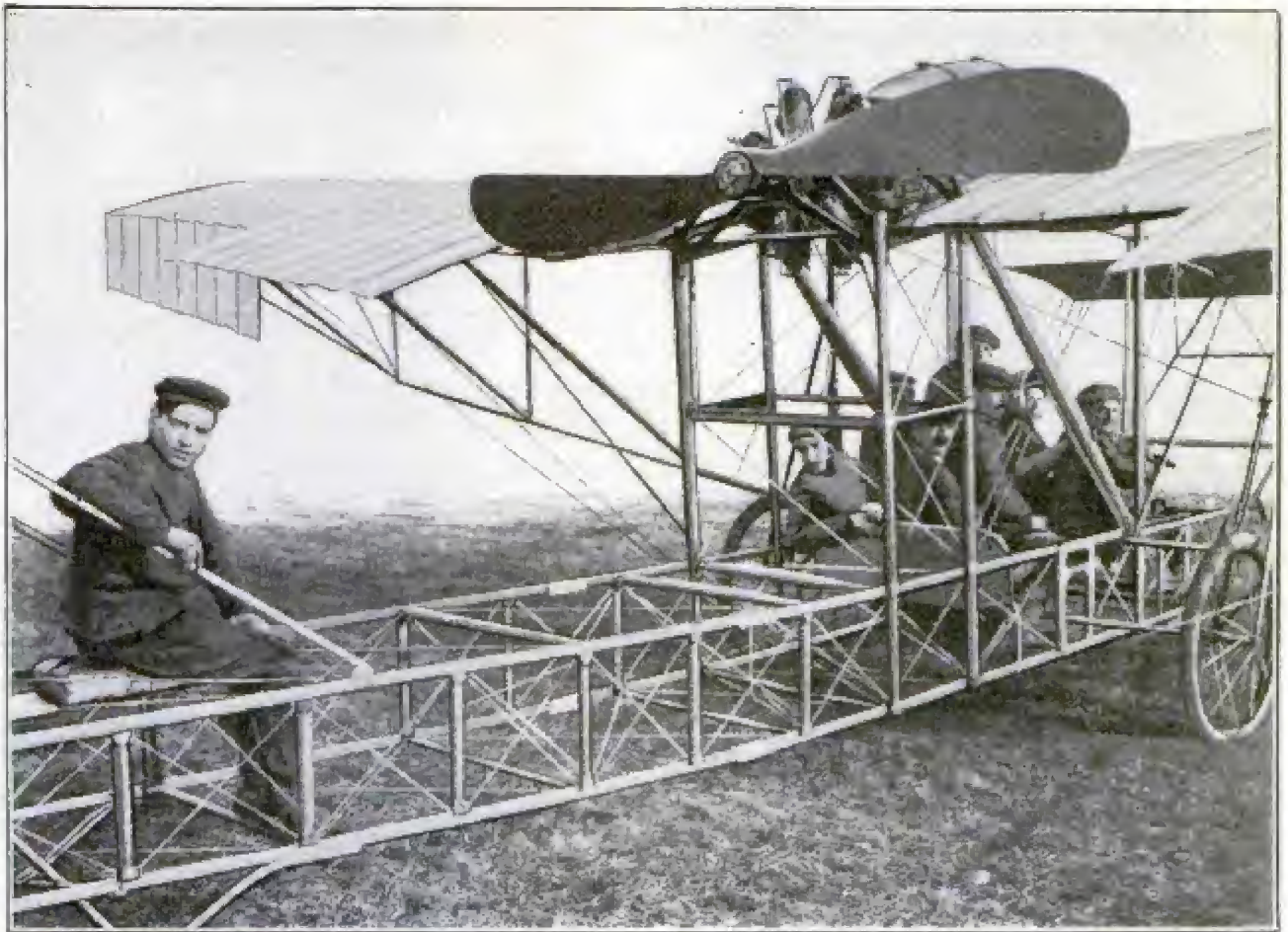
for this purpose. The protruding point of an exceptionally long hatpin, worn by a young woman standing next to him in an elevated train, not only annoyed him but did him physical harm by scratching his face. Polite requests for the withdrawal of the pin having met with no response, the injured man drew a pair of pliers from his pocket and catching the offending point in their jaws, dexterously bent it upward, thus eliminating all danger to other persons in its vicinity.

BRIDGE RECONSTRUCTED IN LESS THAN TWO HOURS

A record in small bridge reconstruction was made recently on one of the divisions of the Pennsylvania Railroad. The reinforced concrete slabs which were to form the new spans were placed in accessible positions along the tracks, and when all was in readiness, two powerful wrecking cranes tore up one side of the bridge, tracks, spans, and all. Within 30 minutes the concrete slabs were placed on this side and tracks laid, after which



Old Span Torn Away and Replaced by Reinforced Concrete Slabs without Interrupting the Train Schedule



Bleriot Monoplane Just Before the Flight with M. Lemartin and Seven Passengers

the other side was treated in the same manner. Not a single train was delayed or thrown off schedule, notwithstanding the fact that the bridge is on the main line between Washington and Buffalo.

Reinforced concrete slab spans for small railroad bridges of this nature are said to form a road bed so solid that the fastest passenger trains and heaviest freights do not produce the slightest tremor.

AEROPLANE CARRIES EIGHT PERSONS

The remarkable flight of the French airman, M. Lemartin, with seven passengers, one of which was a woman, was made with a 100-hp. Bleriot monoplane having a supporting surface of 430 sq. ft. The combined weight of Lemartin and his passengers was 1,041 lb.; the fuel and lubricating oil, 66 lb., and the machine, 1,320 lb., making a total of 2,427 lb. to be supported by

430 sq. ft. of surface, which is 5.63 lb. per square foot.

Although the flight only lasted five minutes, it demonstrated the possibilities of flights without passengers of a duration and distance that would far eclipse anything heretofore accomplished. The combined weight of the airman, the seven passengers, and the fuel and lubricating oil carried in the 5-minute flight was 1,107 lb. Allowing a weight of 165 lb. for the aviator, and the balance, 942 lb., for fuel and lubricating oil, the machine should be able to keep in the air for over 12 hours, and, at a speed of 61 miles an hour, cover a distance of about 800 miles.

¶The aeroplane has been put to practical use by the United States army along the Mexican border, having been several times utilized to convey messages and orders between detachments at various stations and from headquarters to outposts.

OREGON PLANS NEW LEWIS AND CLARK MONUMENT

On the extreme western point of Oregon, where the first salt to be



Lewis and Clark Monument Being Erected in Oregon

made west of the Mississippi river was taken from the Pacific Ocean by the process of evaporation, there will be erected a tall shaft of native stone in memory of the leaders of the Lewis and Clark expedition. The members of this expedition were the first white men to reach the far northwestern shore and the monument will stand among the still existent remains of the cairns in which they made their salt. Six hundred tons of native cobblestone and cement are to be used in the construction of the shaft, which will stand on a 22-ft. base, 63 ft. above the ground.

THE KAISER "PURIFIES" THE GERMAN LANGUAGE

The efforts of our only living ex-president toward the establishment of a reformed spelling have been totally eclipsed by Kaiser Wilhelm. The German monarch aims at nothing less than the elimination of all Latin phraseology from scientific nomenclature and the substitution therefor of purely German words.

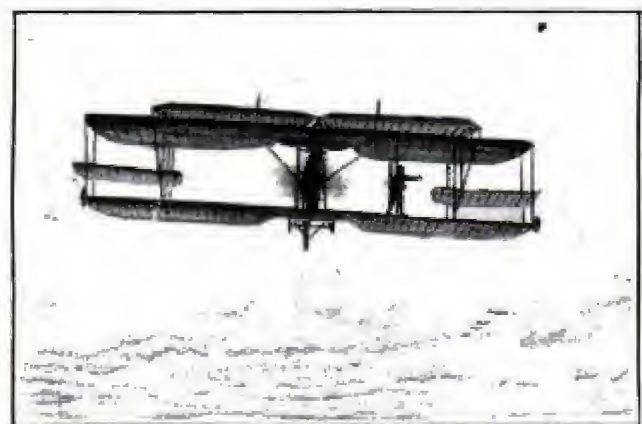
If the Kaiser is successful, it will mean the complete rewriting of all scientific works in the German language. But this is not all. The present Latin forms are comparatively simple and easily understood. For instance, the term "fraktionierte Distillation" (fractional distillation), as it now appears in German, would become "bruchstückweise flüssige Verdampfungsstoffaufsägung zu verschiedenen Wärmestärken."

ASK SALVAGE FOR BALLOON UNDER MARITIME LAW

Navigation of the air brings before the French tribunals all sorts of new questions of law. Some months ago two French aeronauts were carried out to sea in a storm and were compelled to descend on the water about 1,000 ft. from the shore. After anchoring the balloon, they saved themselves by swimming, reaching the shore in an exhausted condition. While several fishermen were attending them, others towed the balloon ashore. Claiming the balloon should be considered as ordinary wreckage, these fishermen recently sued for one-third its value as salvage money.

CODY CARRIES PASSENGER ON AERO'S WING

One of the most spectacular aeroplane passenger carrying feats of recent record is that credited to S. F. Cody when he made an ascent in Eng-



Airman Cody Carrying a Passenger Standing on the Wing of His Aeroplane



Roofs in a New York Factory District During Fire Drill

land with a passenger standing between the planes of his biplane about midway the length of one wing. This flight was regarded as particularly perilous because of the uneven distribution of the weight. A perfect balance of the machine was maintained by expert maneuvering.

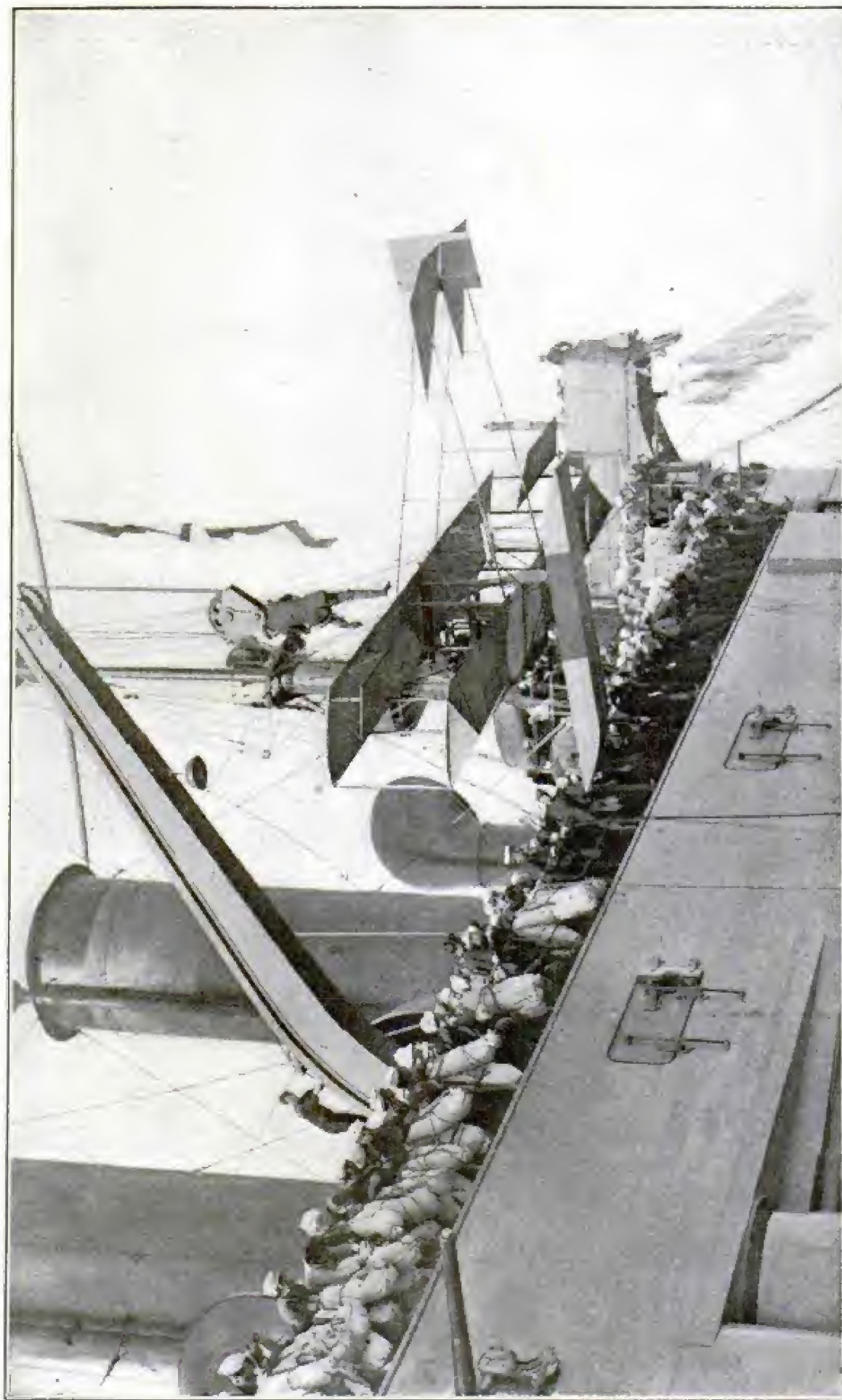
TRAIN FACTORY HANDS TO AVOID FIRE PANIC

How well employers of labor in New York and vicinity have taken home the lessons taught by the recent disastrous factory fire in Newark, N. J., is shown by the recent institution of fire drill among the employes of many factories, by means of which the buildings may be quickly emptied in case of accident of any sort. The roofs of their own and adjoining structures are used in practicing the exit of the employes, who are now taught to walk quietly and without undue haste to the various exits provided for them. Each group of employes is given a certain door to use and route to follow, in

case of fire, and there are frequent tests of the plans. A fire alarm is sounded and the employes are marched out of the building in accordance with the plan, the alarms being given at unexpected times. The success of these maneuvers is manifested by the fact that buildings are emptied in an exceptionally short time without confusion or congestion at the exits. The same system is applicable to tenement houses.

¶The Zeppelin expedition to consider the feasibility of reaching the north pole by dirigible, of which Prince Henry of Prussia was a member, has returned from Spitzbergen with the report that dirigible ballooning has not reached a stage sufficiently advanced to warrant such an undertaking.

¶Onyx of colors varying from a rich chocolate to a high amber, unlike any variety previously known, has been discovered in immense deposits in the mountain of El Talan, 12 miles from the city of Oaxaca, Mexico.



THE CURTISS MACHINE BEING HOISTED ABOARD THE CRUISER "PENNSYLVANIA" AFTER A WATER FLIGHT AT SAN DIEGO, CAL. THE MACHINE WAS LOWERED INTO THE WATER AGAIN AND FLEW BACK TO ITS HANGAR ON SHORE

COMMENT AND REVIEW

WHILE a number of gentlemen engaged in export trade were relating their experiences recently, an incident was mentioned which should be suggestive to any concern contemplating foreign trade. A certain large manufacturer of laundry machinery is located in Spain. He needed an extra lathe, the price of which in this country was \$3,600. Being in a hurry, he cabled his order and was answered that on account of orders already in hand shipment could not possibly be made under four months, to which must be added another month in transit. Notwithstanding he could have bought in Germany for less money and had the machine laid down in his shop in three weeks, he preferred to wait and get the American-built machine.

Why the American Machine Won

To an American friend the purchaser explained the reason. He said the German machine could not be put to work on arrival but would have to be fixed. Bolts would not fit holes, parts would not assemble as they should, and from a few days to two weeks must be spent in getting the machine in condition to start up. Then for a longer time there would be constant stops and delays until finally no more alterations were needed.

"On the other hand," said he, "I know when I uncrate the American machine, all I have to do is to bolt it down and throw on the belt, for it is in perfect running order and ready for the heaviest job it is capable of, right from the start." This man had bought from German and American builders before, and spoke from experience.



ANOTHER case was that of an English manufacturer of cotton cloth, who had enjoyed a large trade for many years with a rich Chinese importer at Hong Kong. One day he received a letter stating the last shipment was unsalable and was therefore refused. The goods were identical in quality, size, weight and design to former orders, and what the trouble might be no one could imagine. However, as the shipment involved thousands of dollars and the customer's future trade very much more, a competent man was dispatched from England. This is what he found. To satisfy the local trade, there had been printed on each piece of cloth a good luck sign, or what with us corresponds to a trademark. This sign consisted of the figure of a dragon, about the size of a silver half dollar.

What a Modern Dragon Did

Continued use had so worn the printing plate as to necessitate the engraving of a new one. This was apparently identical with its original, but on actual measurement proved to possess wings one-eighth of an inch longer in the new than the old one, which was sufficient to queer the goods with the retail buyers who insisted they were no longer being served with the Simon-pure article. Evidently the Chinaman has the "just as good" idea developed to a much higher degree than we Americans.

The morals are obvious: In the first, build your machines yourself, and do not leave part of the work for the purchaser; in the second, one cannot know the little details of foreign trade too well.

NOT so long ago to have crossed the ocean in a bed instead of the then stuffy, uncomfortable berths, was considered the event of a foreign trip, and something to relate to the neighbors. Today every first-class Atlantic passenger steamer has a large number of staterooms so equipped, not only in the cabins de luxe, but on other decks as well. An eastern railroad has recently put in operation on a one-night run, apartment car sleepers with real beds and dressing-room accessories. One or two interurban trolley lines have also provided bedrooms on a smaller scale. Now that the demonstration has been made, it is hoped that the idea may be extended over other roads, and that the uncomfortable cages misnamed drawing rooms may soon become things of the past.

*Comfortable
Beds for
Trains*

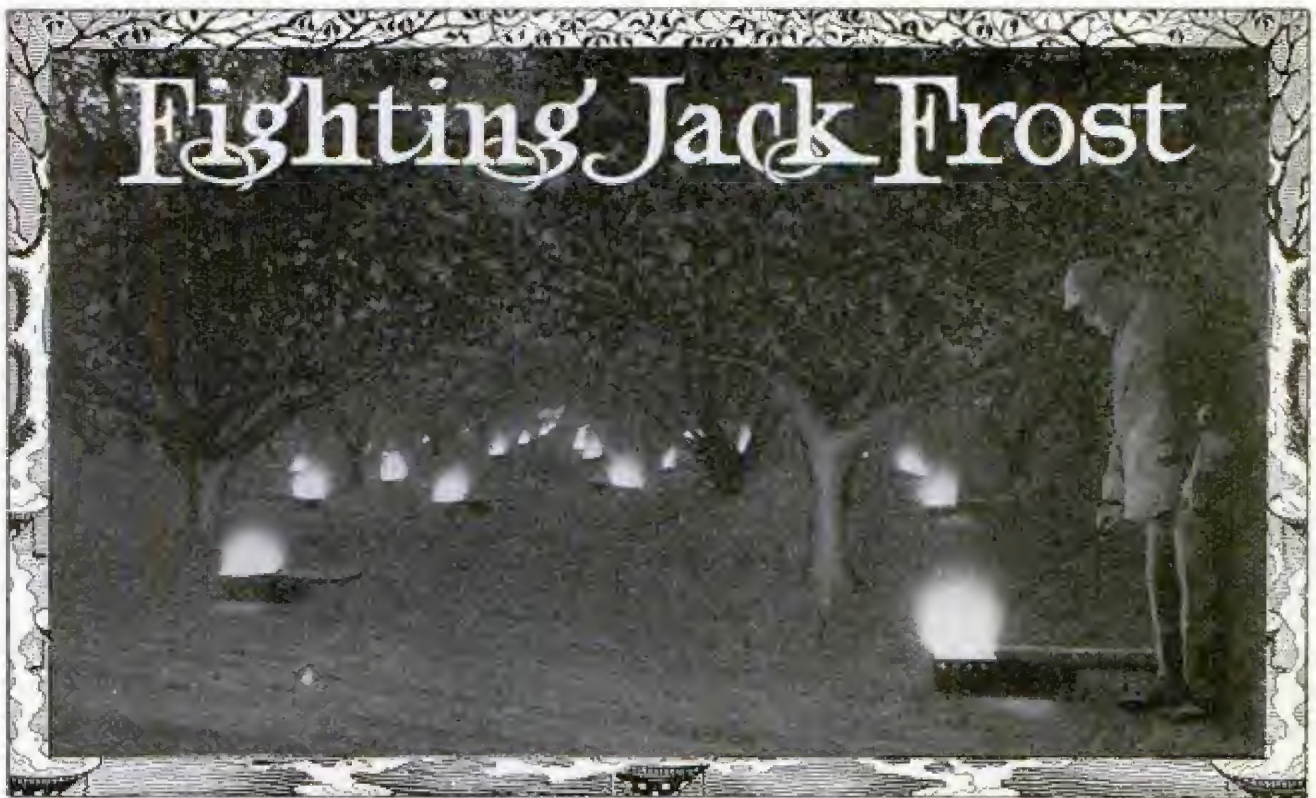


ENGLAND and the United States are the two large powers where compulsory service in the army in times of peace is not required. From time to time, and more frequently of late, we are told that before many years have passed, it will be necessary to enforce one to three years military service here from every able-bodied young man. The idea is extremely repugnant, for while the physical and disciplinary value is admitted, it would mean the taking of the very years in which the average young man really fits himself for his life work. To return to this preparatory work after three years of military life is by no means easy, as anyone who has dropped his studies for two years, well knows. The training to obey without dispute, to be punctual and respectful, are things in which the American

*Compulsory
Military
Service*

boy is lacking, but could not all this be reasonably accomplished with drill of one hour, or less, a day, compulsory if necessary, for all boys in upper-grade public schools and students in high schools and colleges? Moreover, it should not be forgotten that the average American boy is a very fair shot and with a minimum of training would quickly become an excellent sharpshooter. With a fair knowledge of tactics acquired at an age when he learns easily and rapidly, he would develop into an excellent soldier ten years later, if necessity required his services, in a very short time. There are many things in our modern school curriculum for which military training might be substituted with very great advantage. In cities of sufficient size, the instruction could be by a regular army man; in the small towns and country districts, the training would be less efficient both through inferior instruction and lack of that enthusiasm which comes only from massed forces, yet much could be accomplished even there.

H. H. WINDSOR



Oil Smudge-Pots in Operation in Grand Valley, Colorado

Western Orchardists Will Heat All Outdoors with Smudge-Pots to Prevent Recurrence of Damage Caused by Cold Wave a Year Ago When Crops Were Lost

By LOUIS MEYER

MILLIONS and millions of dollars are spent annually as insurance protection against fires—against heat. Now comes the proposal to equip the nation to fight cold by starting fire, and the organization of a system along the line of volunteer fire departments to save the crops of the nation from the millions of dollars of loss suffered annually by frost and freezing.

At the outset, of course, the proposition to heat all outdoors sounds absurd, but it has been demonstrated by science that this very result can be obtained. When a cold wave swept the entire nation in April, last, the total loss caused to the fruits and other crops of the United States in one night was estimated at from \$75,000,000 to \$100,000,000. But there was one section of the country immune,—the Grand Valley of Colorado where a

\$3,000,000 crop of fruit was saved by the use of smudge-pots, or more properly, orchard heaters. In some parts of Europe this method of preventing crop losses has been known for years.

Orchard heaters were used for the first time in the Grand Valley three years ago. Last year was the first time that their practicability was effectively demonstrated. Before that period an effort had been made to induce the orange growers of California to experiment with orchard heating, using ordinary lard pails and crude oil, which was obtainable in the refineries nearby at a trifling expense. The orange growers were not only skeptical but also were reluctant to admit that there was any danger from frost. Finding no market for the pails which he had manufactured for the purpose, a California grower thought he might work



Refilling Coal Smudge-Pots with Fuel

them off on the orchardists of the Grand Valley. The manager of a fruit growers' association agreed to help him when he arrived in the valley, but the growers were not at all enthusiastic. However, rather than ship them back, the pots were offered for little more than the freight, and as the Weather Bureau happened to send out a frost warning at that auspicious moment, some of the more progressive growers agreed to experiment with the pots. The result was that they saved almost their entire crop, while others in the valley lost everything.

The success of these ranchers with the pots, started the inventive minds of the valley citizens to work. While these first pots burned oil, the proximity of coal mines turned their thoughts to coal. One man patented a cone-shaped pot, with holes for under-draft to hold about half a bushel of coal. Another originated a similar pot. A third devised a pot which holds twice the amount of coal. All were provided with covers to keep the fuel dry during the period not in use.

In addition to these, there are scores of pots not patented. One of the most inexpensive is a wire-basket made of

poultry netting, which costs about six cents each. Others used a stove-pipe section, cutting a draft near the bottom and providing a grate to keep the coal from the ground.

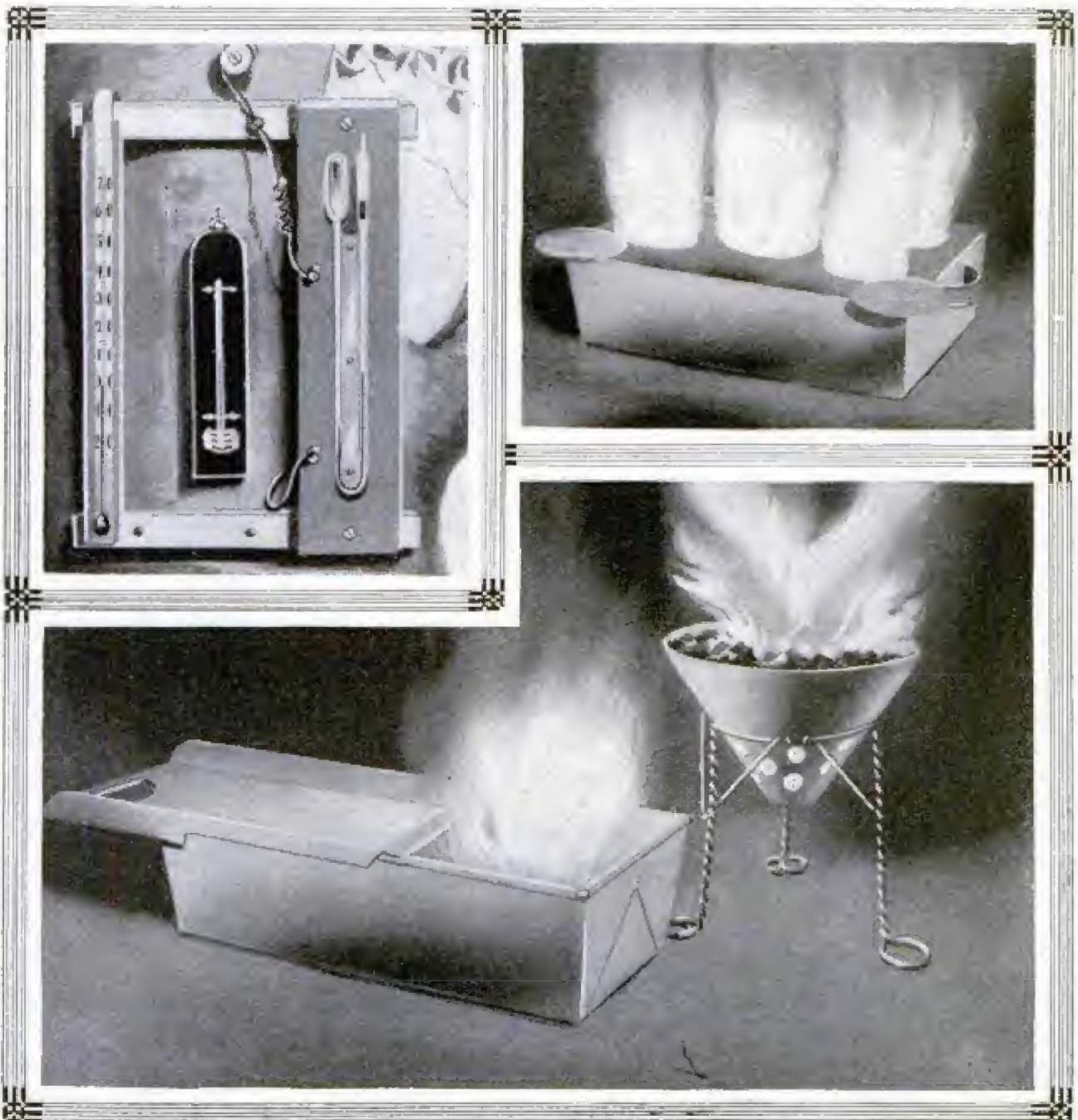
Oil, of course, is easier to handle than coal, and for this reason many believed that this variety of pot would be more popular. The ordinary lard pail formed the basic principle of the first pots and the inventors tried to improve upon that idea. A Cañon City man designed a heater similar to this bucket in shape, but with an underneath draft and features to conserve the oil and distribute the heat.

Last season the new theory of saving crops from frost was effectively proved. The ranchers who smudged their crops saved them—the men who did not lost them. On the morning of April 16th the mercury in some sections of the valley dropped 15 degrees below the freezing point, at the same time a cold wave swept the country, causing a loss of millions of dollars. It was demonstrated then that temperature could be maintained at 32 degrees in an orchard while it was as low as 17 degrees outside, and for long periods of time. For possibly six hours the mercury was

below the point where the peach, pear and apple buds were in danger. This is agreed by experts to be from 28 to 30 degrees in the condition the trees were at that time—in full blossom.

Not all of the orchardists who "smudged" saved their crops, but practically every man who did not mourned his lack of foresight in not providing the little heaters for his orchards. The men who used the pots intelligently, as a general rule, were successful. But it was also shown that proper equipment must be provided and that it must be

used with all proper care and system. Some of the ranchers are arranging now to fire their smudging pots on the same general plan that is used for fire protection in the larger cities—namely a fire department. One of the largest ranchers in the valley, with over 200 acres, will man his heating apparatus with a volunteer department of a dozen men, trained in advance for the duty of lighting the pots in his orchard. While of course it appears somewhat useless to train a volunteer corps for service only one or two nights in a season, and



Upper Views Show Alarm Thermometer which Warns Fruit Growers of Lowering Temperature through Electrical Connection, and Oil Smudge-Pot with Fire Openings, Invented by a Colorado Fruit Grower. Lower View Shows Types of Reservoir Oil Heater and Cone-Shaped Coal Heater

possibly not that, yet the cost of this insurance is amply repaid.

The pots are placed from 50 to 100 to an acre, and some of the orchardists are figuring on providing a reserve set of pots for an emergency occasioned by a long freeze such as occurred in April, 1910. These pots must be arranged on some systematic plan in the orchard with the lighters or kindling all on one side. Haste in lighting the pots is one of the essentials, and many ranchers lost thousands of dollars last year because they had placed the pots in haphazard fashion about the orchard, and could not find them in the darkness when the alarm sounded.

Especially in the use of coal is a large force of men needed, for during a long continued freeze the pots must be refilled during the night. To meet this difficulty, the men in the cities are called upon for assistance. The secretary of the Grand Junction chamber of commerce has taken charge of this part of the frost fight, and by marshaling a force of volunteers and providing automobiles for their transportation, aid is available at the critical stage of the night. The telephone com-

pany and weather bureau cooperate by sending out repeated warnings of danger to the ranchers during the danger period, and when the mercury drops, whistles blow and the bells ring, sounding a general alarm. The experience of two years has demonstrated that the old system of smudging—"making a smoke,"—is not a success, and that heat as well as smoke must be provided to save the fruit. Some of these heaters will raise the temperature in an orchard more than 15 degrees, or rather maintain the heat that much above the temperature on the outside.

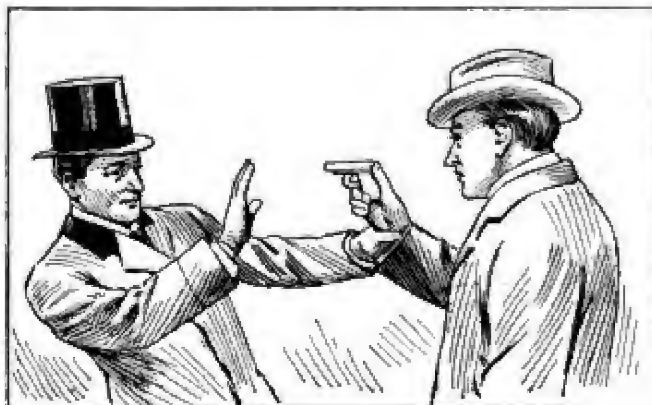
While there is much difference of opinion as to the respective merits of coal and oil pots, last season's experience has demonstrated the success of the smudge-pot as an economic necessity. The heaters can be successfully used not only for fruit where the returns are hundreds of dollars an acre, but for strawberries and low-growing crops. The only objection to its general use for all purposes is the cost, for unless a return of \$50 an acre can be depended upon, the expense of operating the pots, coupled with first cost, would outweigh the profits.

REVOLVER CIGARETTE CASE

One of the newest Parisian novelties is a cigarette case of a shape very similar to the latest types of automatic revolvers, although, of course, much smaller. The person at whom it is suddenly pointed is taken sufficiently unaware to believe it a real revolver,

until disillusioned by the appearance of a cigarette when the trigger is pulled.

☞Candles set against ice in a refrigerator for a half hour will not burn fast or make ugly drippings.



Held Up with Apparently Deadly Weapon



Which in Reality is Only a Cigarette Case

ATLANTIC COAST CANAL OPENED

The formal opening of the Beaufort canal, which is the first link of the proposed inland waterways from Maine to Florida, was celebrated at Beaufort, N. C., in January. The canal, which is 20 miles long, from 90 to 250 ft. wide, and 10 ft. in depth at mean low water, has been under construction since 1907. Some five miles were cut through dry land, the remainder being made by dredging and straightening two creeks. It cuts off about 90 miles of distance, and enables ships in the coastwise trade to avoid treacherous Hatteras and Cape Lookout.

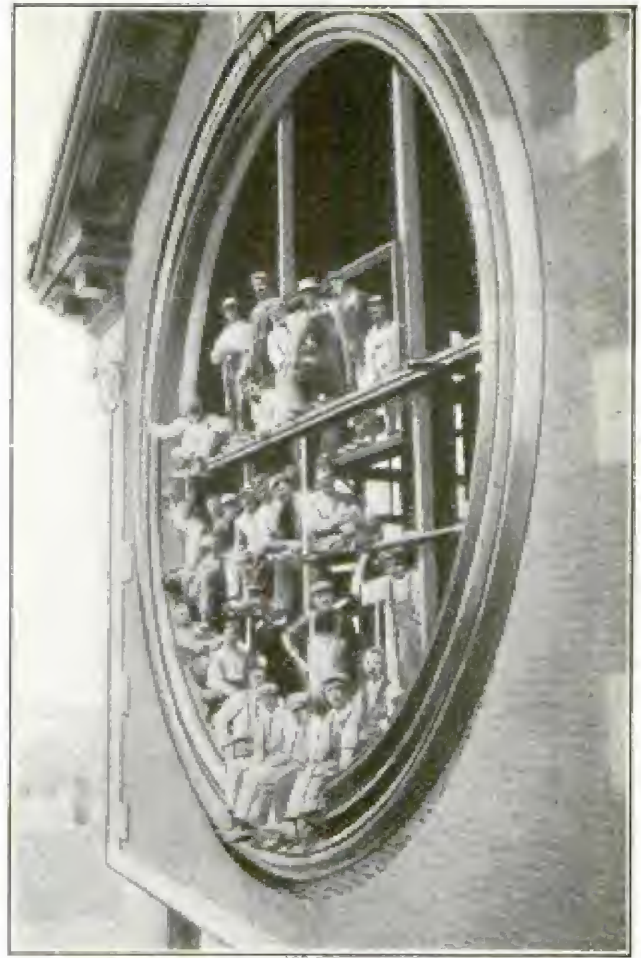
INVERTED PIPES

A Scotchman has invented an inverted pipe from which the lighted tobacco will not fall out. It consists of a tapered bowl, the lower part being very small. The bowl is filled from above by removing a cap, but the tobacco is lighted from below so that it will burn upwards, which is claimed to be the natural way for smoking. The stem being at the top, prevents any noxious substances entering the mouth, and gives the pipe a clear draught.

LARGE STRIKING CLOCK FOR MASSACHUSETTS MILL

At the Ayer Woolen Mills in Lawrence, Mass., there is being installed a large striking clock, one of the largest of its kind, the dials of which are 22 ft. in diameter. The machinery and other parts of this clock weigh 40,000 lb., or 20 short tons. The hands are about 14 ft. in length. The faces are of ground glass, in cast-iron frames, and will be illuminated at night. The clock has a gravity escapement, and is wound up every eight days. The pendulum rod is about 15 ft. long, and weighs, together with its bob, 270 lb.

The materials in the dials are: cast iron, 27,500 lb.; lead, 1,140 lb.; bolts and screws, 450 lb.; glass, 5,500 lb.;



Opening for Dial of Monster Clock

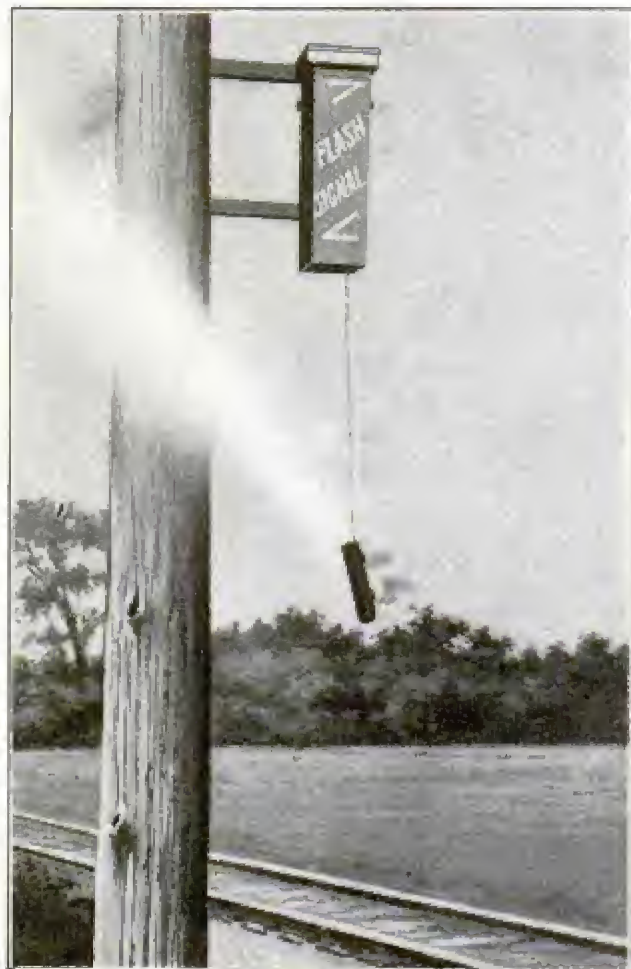
putty, 1,000 lb.; a total of about 36,000 lb. The dials are securely braced with heavy adjustable bolts to great I-beams which also support the dial works, gears and shafts on which the hands are mounted. The hands are made of pine wood, cut from single boards, 18 in. wide and 14 ft. long, and fastened at the center with heavy cast-bronze bearing plates.

The striking mechanism of the clock is connected to the time part electrically, so that at the hour only, and exactly on time, the clock will strike the correct number of blows on the great 5,000-lb. bell that is in the room below. The blows are struck by a cast-iron hammer weighing 120 lb.

The clock works are 9 ft. long, 5 ft. wide, 8 ft. in height, and weigh about 4,500 lb. The clock is fitted with electrical connections to control any number of secondary clocks that may be placed in the building. The big time-piece is guaranteed not to vary more than 15 seconds a month.

EMERGENCY TORCHES TO PREVENT COLLISIONS

This system of emergency torches, to be ignited when a dispatcher has made a mistake that is sending trains



This Emergency Torch, Controlled by an Electric Circuit, is Dropped and Ignited to Prevent an Impending Collision

together on the same track, was devised by a dispatcher who was held responsible for a fatal collision on a Canadian railroad. Such a system cannot be compared in any way with

the block system, but it is very inexpensive as compared to the latter, and is designed for pioneer roads.

The idea is to place the torch containers, four to the mile, on the telegraph poles skirting single-track railroads. The torch, filled with a combustible which burns slowly with an intensely brilliant flame, is held in an inverted position in the retainer by a holder controlled by a small electromagnet. At the lower end of the torch, as it hangs in the retainer, is a wooden plug carrying a small vial of sulphuric acid, which causes the torch to ignite when the latter drops.

The operation of the torch system is by an electric circuit. Should the dispatcher inadvertently send a train on to a section of line being traversed by another train, he closes the electric circuit by pressing a button. This has the effect of energizing the magnet of every torch retainer along the section where disaster is threatening, and the torches fall to the extent of the retaining wires with which they are provided. In dropping, the wooden plug carrying the sulphuric acid vial of each torch is knocked over, causing the torches to burst into flame.

RAILROAD BRIDGE FRINGES GREAT WALL OF ICE

One of the most remarkable bridges ever built, so far as location is concerned, is the Miles Glacier railroad bridge in Alaska, a description of which has been printed in this magazine.



Miles Glacier Railroad Bridge in Alaska



86-Foot Shallow-Draft Motorboat

The accompanying illustration shows the bridge as it appeared, apparently holding back a great wall of ice. At times the movement of the glacier was so great that two shifts of men had to be kept at work continuously, clearing the ice away from the upstream side with long ice chisels.

CANAL MAY CONNECT LAKES ONTARIO AND HURON

The construction of a ship canal from Hamilton to Goderich, Ont., has been proposed. Such a canal would connect Lake Ontario directly with Lake Huron and thus obviate the necessity for traversing Lake Erie. This would save 1,700 miles of marine transportation in lake traffic from the west, and would enable the establishment of through steamers from Duluth and Chicago to Liverpool by way of the lakes and the St. Lawrence River.

Hamilton is at the western extremity of Lake Ontario. Goderich is on Lake Huron. The commercial men of Toronto are interested in the project because it is believed that its realization would make the Ontario capital a great commercial center.

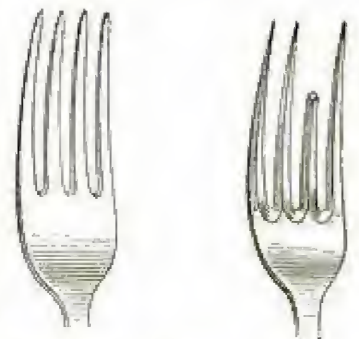
¶The "Lusitania" established a new eastward passage record Jan. 24 when she docked at Liverpool 4 days, 18 hours and 40 minutes out from New York.

LARGE MOTORBOAT WITH SHALLOW DRAFT

A motorboat, 86 ft. long, yet drawing only 2 ft. of water, has been built at an engineering works in Charleston, W. Va., for cruising in shallow rivers. The hull, which has an overall length of 86 ft., with an 11-ft. beam on waterline, and a 15-ft. deck beam, is constructed of steel. A tunnel stern is provided for the propeller, so that the greatest draft is 2 ft. The power plant develops 125 hp. and drives the boat at a speed of 15 miles an hour.

THIS FORK IS EASY TO CLEAN

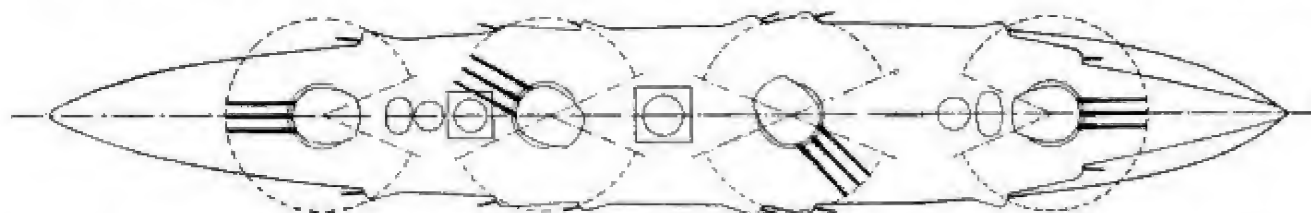
Ordinary flat-tined forks are difficult to clean, and it is a common thing to find portions of the polishing paste still clinging to the edges of the tines after carefully rubbing with the polishing cloth. In order to do away with this objection-



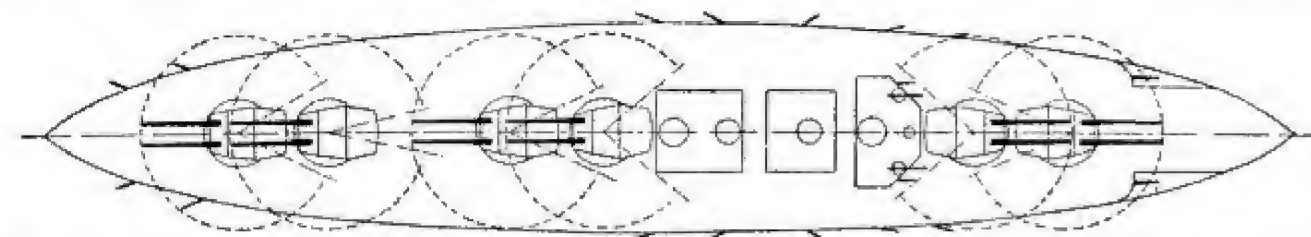
able feature, an English inventor has devised a fork the tines of which are diamond-shaped in section. The old and new styles of forks are contrasted in the accompanying illustrations. One of the prongs of the new fork is cut away to show the section.

BATTERY ARRANGEMENTS ON DREADNOUGHTS

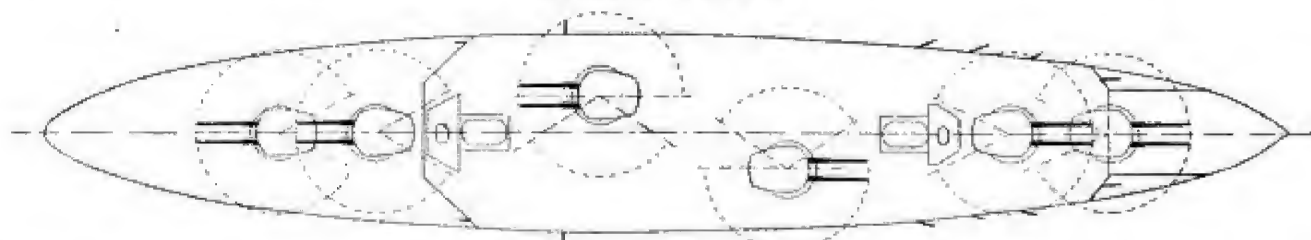
It is interesting to note the different arrangement of the main batteries of four recent types of dreadnoughts, the guns can fire fore and aft within 15 deg. of the keel line. The arrangement of turrets on the French ship sacrifices



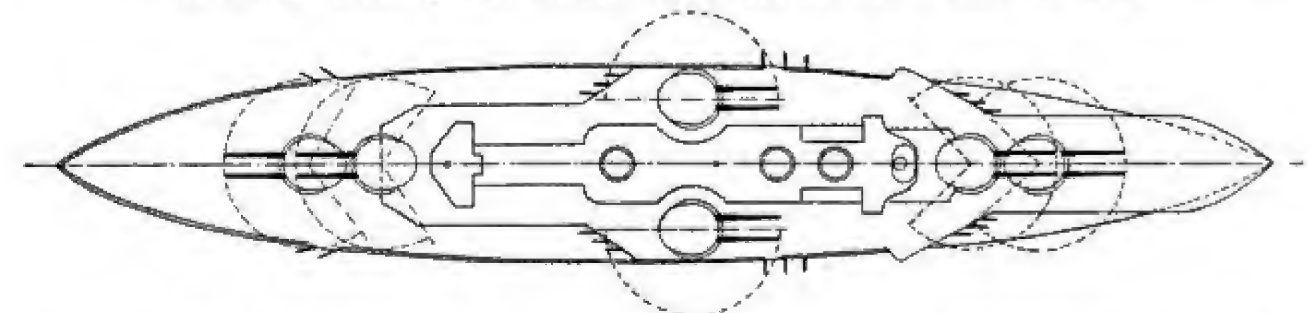
Russian "Sebastopol" Dreadnought—As the Four Turrets are All on the Same Level, Only Three Guns Can Fire Direct Ahead or Astern



Gun Arrangement of U. S. S. "Wyoming"—Four Guns Can Fire Direct Astern and Ahead and All Twelve on Either Broadside



"Rivadavia" of the Argentine Republic—Although the Guns of This Ship are Not All on the Center Line as on the "Wyoming" and "Sebastopol," All May Be Fired on Either Broadside



"Jean Bart" of the French Navy—The Arrangement of the French Guns is Considered Poor, One-Sixth of the Gun Power in Broadside Attack Being Sacrificed to Reinforce the Bow and Stern Fire

ships dealt with being the U. S. S. "Wyoming," the Russian "Sebastopol," the "Rivadavia" of the Argentine Republic, and the French "Jean Bart."

The twelve 12-in. guns of the Russian ship are mounted, three guns to a turret, on the longitudinal center line, giving a broadside fire of all 12 guns throughout an arc of 130 deg., but only three guns can be fired, end on, within 25 deg. of the keel line. The American ship has a broadside fire of all 12 guns through an arc of 95 deg., and four

one-sixth of the gun power in broadside attack merely to reinforce the bow and stern fire.

According to the annual report of the Anglo-Indian government, India has more than 4,000,000 beggars, of whom 2,433,115 are "fakirs" or impostors.

Even Andrew Carnegie, who recently gave \$10,000,000 to promote the peace movement, believes that the Panama Canal should be fortified.

NEW AUTOMATIC FLASHING LIGHT

Since the introduction of the unattended flashing buoy, Trinity House, the organization which controls the safeguarding of the British coasts, has evolved a single apparatus which will turn the gas off and on at the proper times, give a flashing light, and only require attention at protracted intervals.

The first automatic flashing light had automatically revolved lenses, but the light was always burning. Another step was the introduction of a timing mechanism by means of which the gas could be turned on and off at varying times of the day and night, according to the period of the year.

The new apparatus is very simple and has met with a remarkable degree of success in the tests. The clock which regulates the turning off and on of the gas is wound by the mechanism which revolves the lens, consequently the apparatus is entirely automatic. The clock is of special form, being provided with two dials, one of which is divided into 24 divisions, representing the hours of the day, and the other into 12 divisions, representing the months of the year. A fixed pointer is provided, and if the dials are set to the day of the month and time of day, the mechanism will light up and extinguish the lamp at the correct time each day, making the necessary variations for the time of year. The power which revolves the lenses and winds the clock is, of course, provided by the pressure of the gas, and the whole mechanism, as well as the lighting of the lamp, depends



Automatic Flashing Light Showing Clock and Driving Mechanism

on the turning on of the gas by the clock.

The quantity of gas contained in the reservoir, which will be located in the base of the apparatus instead of in a tank at the side, as shown in the illustration, will be sufficient to keep the light at work for four months. The flash of the light has an intensity of 8,500 cp.

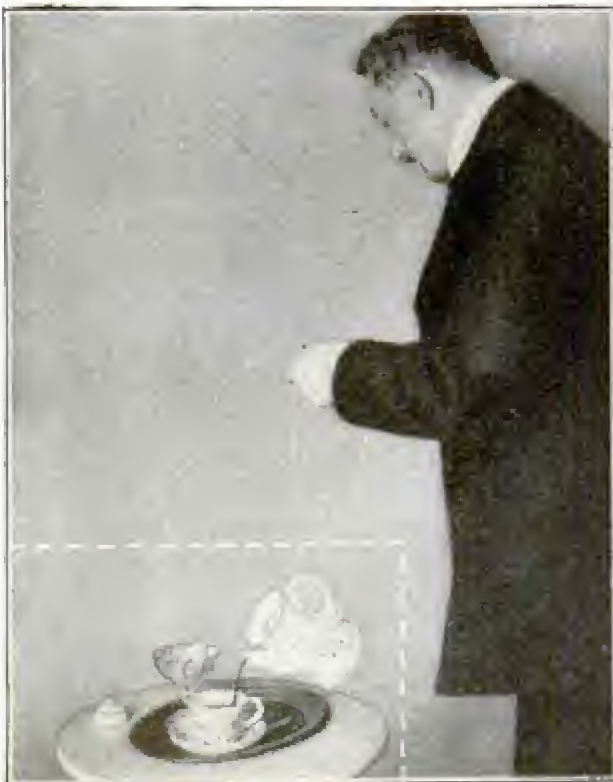
MAKING "FAKE" MOVING PICTURES

Many stirring events, such as the remarkable battle between three presumed Russian anarchists and soldiers, police and firemen in London, are actually caught by the moving-picture men, but many realistic scenes are "faked."

The methods of faking have developed into a highly specialized art. The engagement in battle of an aeroplane with warships, for instance, is produced in a large, shallow tank. Two miniature battleships are in the chan-



Preparing to Show an Automobile Falling Over a Precipice



How Chocolate Pot Pours Out Its Contents without Aid—Section of Picture Which Shows on Screen is Indicated by Dotted Lines



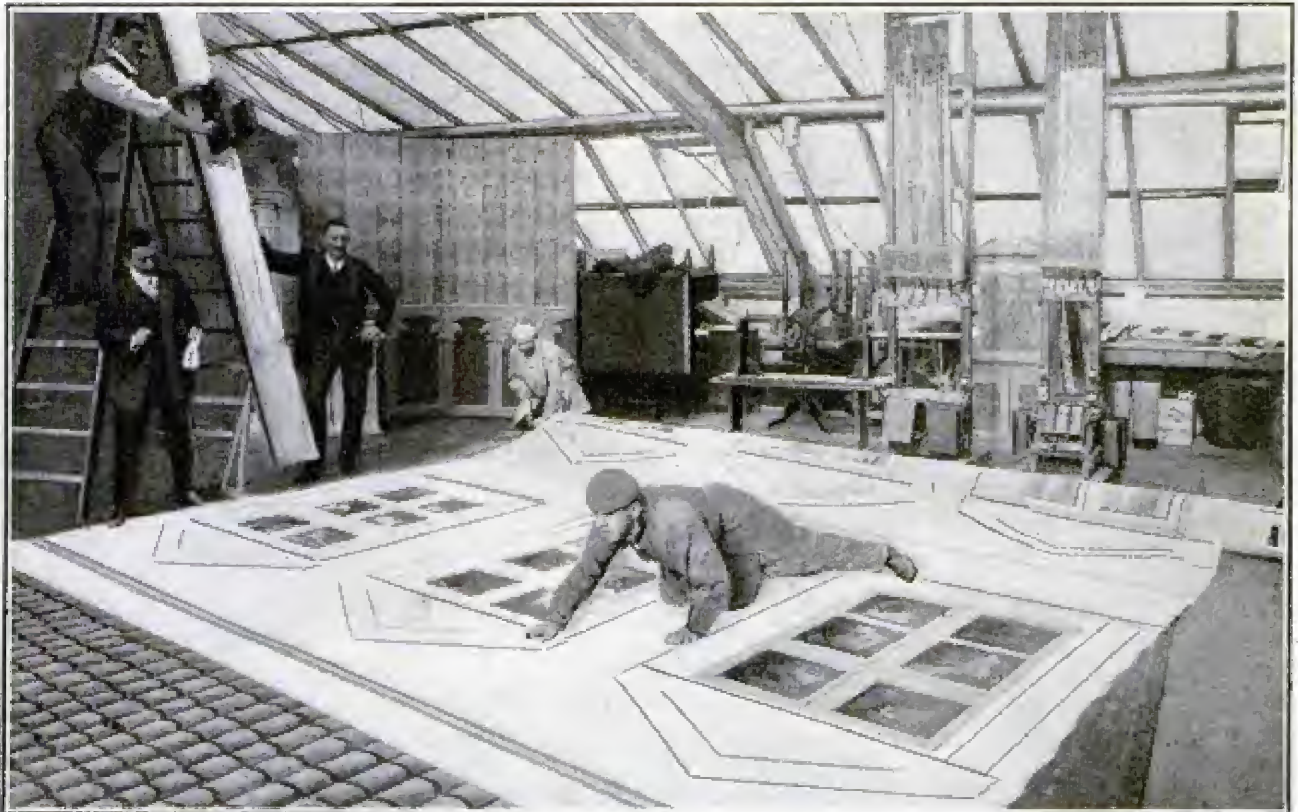
"Faking" a Battle between Aerial Craft and Battleships. Fan is Used to Cause "Waves" and Camera is Pointed Downward

nel and above them is a miniature monoplane suspended by cords. At one corner is a motor-driven fan, the function of which is to make waves on the water. The moving-picture camera is operated from above.

How automobile accidents are worked out with miniature settings, which appear real on the screen, is also shown in the illustrations. In one, an automobile falls over a cliff, and is photographed from the top as it drops.



How a Collision between a Train and an Automobile is Staged for the Moving-Picture Camera



Climbing Up the Face of a Building—How an Obviously Impossible Feat is Made to Appear Real

In the other, an automobile and railroad train collide.

There are, of course, many kinds of moving pictures which the audiences know are illusions, such as a pot or pitcher pouring of itself, or a burglar

climbing as nimbly as a fly up the face of a building. The face of the building in this instance is painted on canvas spread out on the moving picture studio floor, and the "burglar" crawls on hands and knees over it.

HELMET FOR MOTORISTS NO THING OF BEAUTY

Bosco, of childhood's memory, whose principal task, in addition to looking



Not the Missing Link, but a Harmless Motorist Wearing the Newest Thing in Winter Auto Headgear

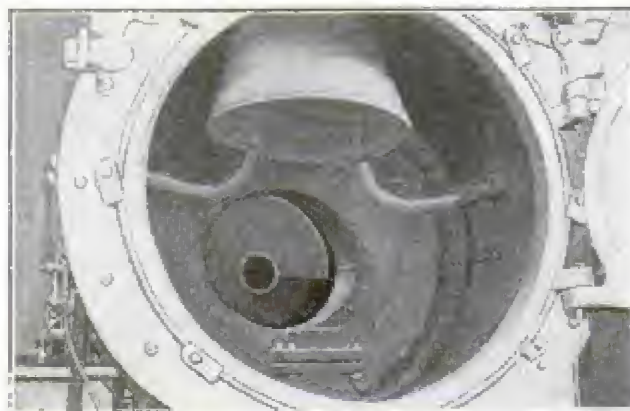
ferocious, was to "eat 'em alive," looked as gentle and benign as Santa Claus when compared with the up-to-date auto driver equipped with the latest thing in cold-weather masks. "Zip, the What-is-it" is the name the racing men have given the new device which was designed by one of their number in Indianapolis and has found favor with the professionals wherever it has been shown. The mask is really a hood made of fur with apertures for the eyes, nose and mouth. It resembles the well-known bearskin shako worn by drum majors, except that it fits over the head instead of on top of it. Goggles are fitted over the eyeholes and a celluloid covering is provided for the nose. The mask makes a most terrifying spectacle of the motorist, but it keeps him comfortable even in zero weather, and as

that is its chief reason for existence, it can be considered a great success.

CENTRIFUGAL SPARK ARRESTER

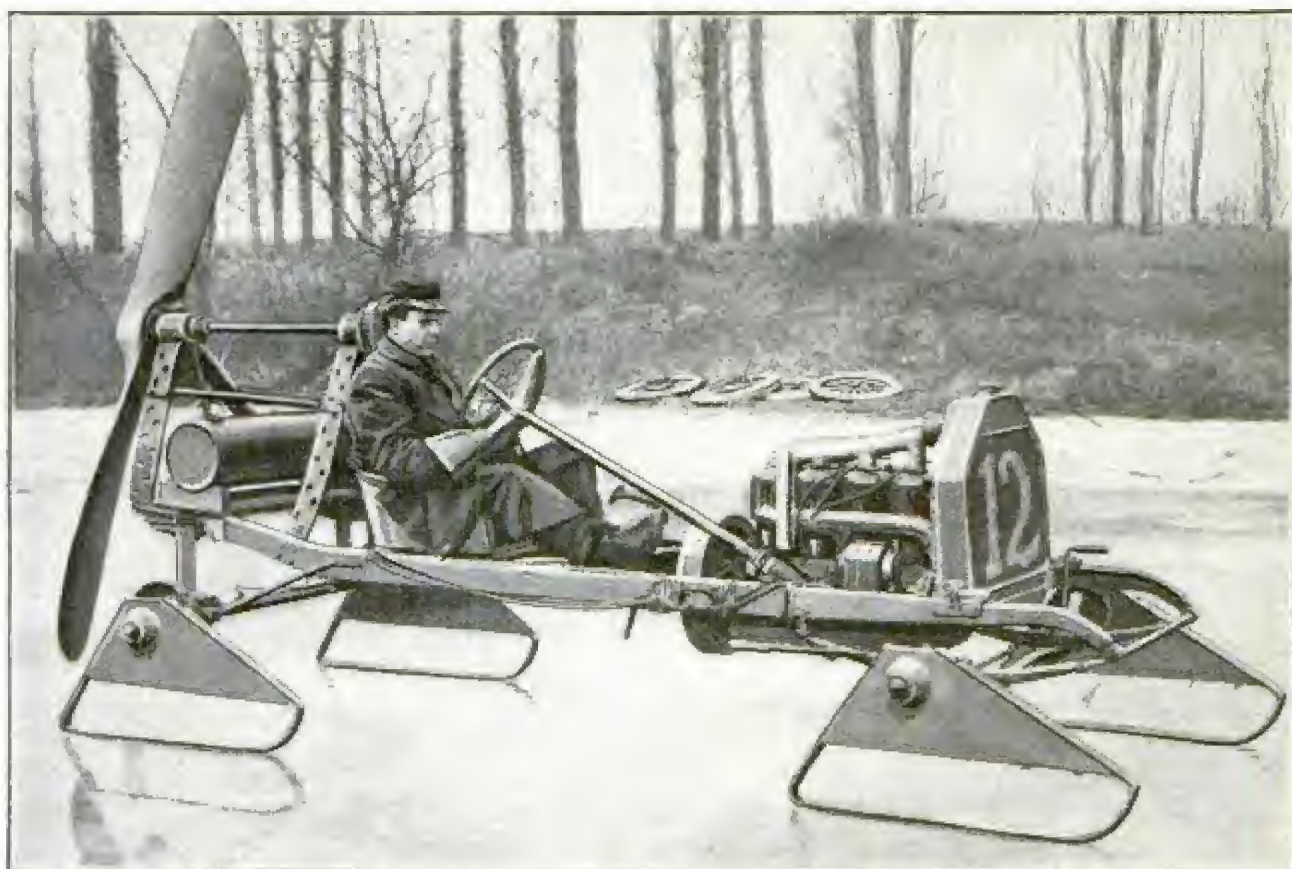
This centrifugal spark arrester for railroad locomotives, favorably tested out on the Chicago & Northwestern Railroad, requires an extended smokebox, the whole consisting of three chambers, in the center of the foremost of which is located the stack, as shown in the illustration. The exhaust nozzle is located directly under the stack, the exhaust steam being carried to it from under the saddle.

Separating the foremost chamber from the second chamber is a large circular plate in the center of which is an opening 22 in. in diameter provided with a collar 10 in. long. At the back of the second chamber is a spiral diaphragm of one revolution separating the second from the third chamber. The claim made for this arrangement is that the gases are diverted by means of the spiral diaphragm, the periphery of which follows the inside wall of the smokebox and advances a distance of 30 in. during one revolution, into the second chamber, where they are given a rotary motion around the walls of the smokebox. This motion throws all heavy particles, such as cinders, to the outside wall and carries them forward over a hopper at the bottom of the second chamber, in which they are de-



Interior of Smokebox Extended for Centrifugal Spark Arrester

posited. The gases then pass through the opening in the collar to the foremost chamber and thence to the stack.



Ice Boat Made from Automobile Wind-Wagon

WIND WAGON-BOAT IS NOW A POWER ICE SLED

The Indianapolis motorist who exhausted the sensations of ordinary locomotion with his automobile and put an aeroplane propeller on it and used it as a wind wagon on land, or supported by a pontoon on water, has now put his machine on runners and negotiates the ice and snow as easily as he did the road and water. There are four runners used to replace the wheels on the axles. The runners consist simply of triangular-shaped wooden forms over which steel rims are fitted. The machine is driven by a revolving 8-ft. air propeller. The use of the machine as a sled on roads is limited, because there is a clearance of but 6 in. between the propeller blades and the ground. On ice, however, the machine makes excellent time.

A long series of experiments at an asylum for the insane in Vienna, Austria, have culminated in the announcement that a cure for progressive paralysis has been found.

NEW OXYGEN PROCESS MAY CHEAPEN SMELTING COST

A new process of separating oxygen from the air by means of cold, announced by President James Swinburne at a recent meeting of the Faraday Society in London, produces the vitalizing gas at so cheap a cost as to suggest its use for blast-furnace work.

According to Mr. Swinburne, a ton of oxygen should be produced on a large scale at a cost of \$1.00, with electric energy at the same price as is paid by the electric street railways of Chicago.

IF YEAR'S SUITINGS WERE MADE INTO ONE

If all the cloth used in the United States for one year in making clothing for youths and men were to be made into a single suit of clothes, this suit would be big enough for a giant over six miles high. Such a man would weigh about 16 billion tons, if built in proportion to his height.

MICROPHOTOGRAPHIC LIBRARIES

A Belgian scientist has constructed a microphotographic apparatus by means of which rare books, valuable documents, magazine articles and newspapers may be reproduced on minute photographic plates in which form they will require infinitely less space for storage than would be necessary for the originals.

The apparatus could reproduce 50 octavo pages (each 6 by 9½ in.) on one 3½ by 4¾ in. plate. As an example, the 154 pages of reading matter in this

ductions will have projecting lanterns of simple mechanical construction by which the tiny plates will be magnified for the use of the public. Rare manuscripts and books would no longer be accessible to the public, only photographic reproductions thereof, and all the larger libraries could, at a comparatively small cost, obtain reproductions of all rare and important documents.

The Bibliographic Institute of Brussels has adopted the idea for the reproduction of part of its collection.



How Octavo Pages of Popular Mechanics Magazine Would Appear Reproduced Photographically on Small Scale for Bibliographic Institute of Brussels, to be Transferred onto Screens by Projecting Lanterns

magazine, each of which is 6¾ by 9¾ in., or only a little larger than an ordinary octavo page, could be reproduced on plates the aggregate size of which would be about three-fourths of a single page.

Reduced to the size of the pages shown in the illustration, it would require a page 18¼ by 12¾ in. to reproduce the 154 pages of the magazine, but the microphotographic apparatus can reduce each page to less than one-fourth the size of one of these pages.

According to the plans, each library having the microphotographic repro-

A \$750,000 OZONE PLANT

A \$750,000 ozone installation, the largest of its kind in the world, has recently been installed at St. Petersburg by a German firm. The plant receives water from the Neva, filters it and thoroughly sterilizes it for human consumption by the application of ozone made on the spot in large quantities by electrical apparatus.

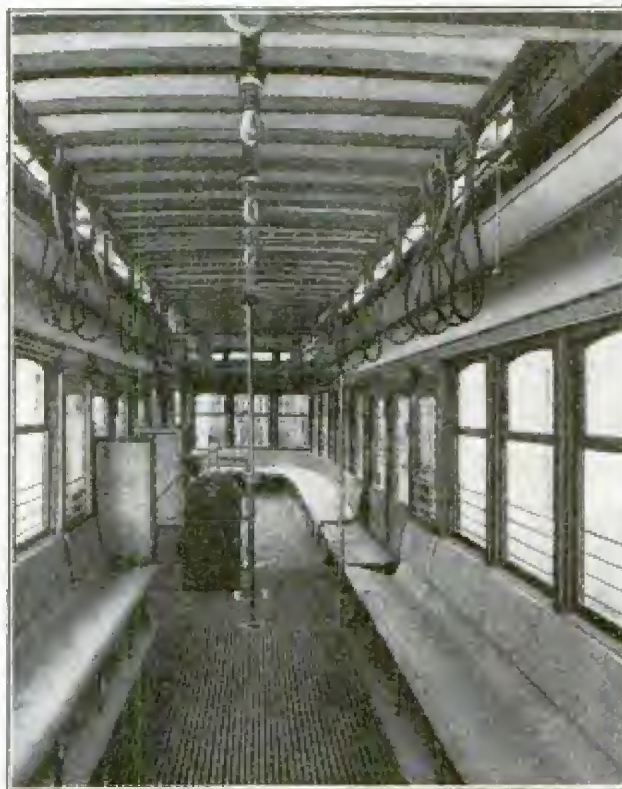
Electrification of the Russian Northwestern Railroad within the environs of St. Petersburg is being considered.

STEEL TRAILERS WITH SIDE ENTRANCE AND EXIT



Steel Side-Entrance, Pay-at-Entrance Trailer

The new steel trailers for the Pittsburgh street railways are pay-at-entrance cars of unique design. Both the entrance and exit are at the center of the car, and the side seats extend all the way around the interior, except across the door. On entering the car, each passenger deposits his nickel in a glass fare box mounted on a metal base. The conductor presses a device with his



Interior View of Trailer, Which is Operated on Pittsburgh Street Railways

foot to drop the nickels from the glass box into the metal one. The car seats 62 passengers.

Recent tests of ball-bearing wheels on German railroad cars are said to have been entirely successful. Two concentric rings with three grooves for different-sized balls were used, one ring being affixed to the journal, and the other fitted into the hub of the wheel.

TENDER LARGER THAN VESSEL IT TENDS

Morton F. Plant, who is having an 86-ft. racing schooner built, recently ordered a motor yacht to act as a tender for the sailing vessel. The motor yacht will be 138 ft. long, which is 52

ft. longer than the vessel she is to tend, and will have a speed of 20 miles an hour, driven by two six-cylinder air-starting and reversing engines of 300 hp. each. The tenders of the tender will be a 21-ft., 16-hp. motorboat, and two row boats, the largest of which will be 24 ft. long.



The Limbs of the Giants



Assembling a Giant

THE GIANTS IN "JACK AND THE BEANSTALK"

Nearly every thing else in theatrical productions gives way to pantomime

for several weeks during the holidays in England, and the spectacular performances are greeted with as much delight by adults, as by the younger generation.

The most prominent feature of the last "Jack and the Beanstalk" productions in London was the huge size of the largest of the giants. This chief giant was so huge that it was impossible for him to be seen as a whole, for the stage would not have been large enough to contain him were the whole of him there. The presence of this giant was first made evident by the appearance of his legs, which could be seen only up to the knees. Later, he swooped one arm down, clutched the princess and carried her off.

One of the several minor giants Jack saw after climbing the beanstalk is shown being assembled in another illustration.



Courtesy Illus. London News
Huge Hand and Arm of the Chief Giant in British Pantomime Production

Canadian railroads built 1,698 miles of line in 1910, and have 3,200 miles in progress of construction.

The Kingdom of Dust

By J. Gordon Ogden, Ph. D.

THIS is the second of a series of articles by Dr. Ogden, who is professor of physics at the Fifth Avenue High School, Pittsburg, Pa. In every home, in every office, in every shop or factory, the fight against Dust is never-ending. Dr. Ogden illuminates this subject in a manner which brings a realization of its infinite importance.

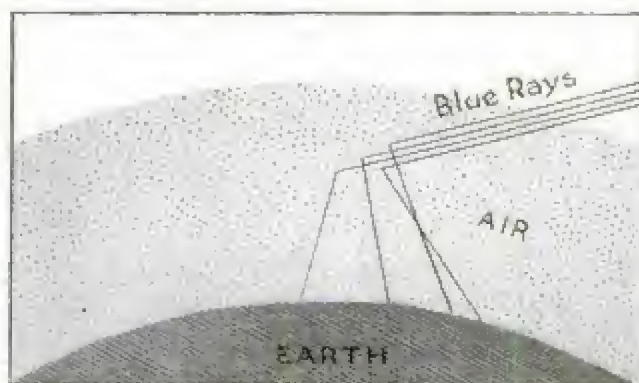
II—Physical Phenomena Produced by Dust

HOW strange it would seem were one to look up at the sky at noon-day, and with the exception of the sun's disk, see just what one sees at midnight; to recognize the various planets and constellations glittering afar in the blackness of night, and the disk of the sun, sharply defined, shining with almost infinite whiteness against the background of impenetrable darkness!

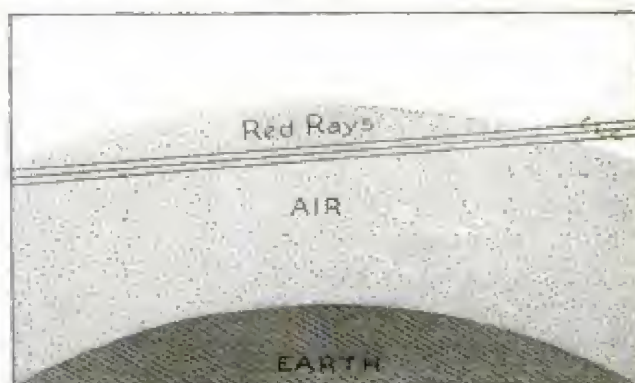
Yet that is just the condition that would prevail were it not for dust. Gone forever would be the beautiful azures of the day sky; and at eventide and dawn, all the wondrous combinations of ruby and gold, rich lavenders and delicate pinks that attend as heralds the setting and rising of the sun, would exist only in the memories of

ible only when looked at directly. The rest of the sky would be black. We would not have the soft diffused light that bathes land and sea in its pure, mellow flood, and constitutes what is ordinarily known as daylight.

The explanation of this strange state of affairs is not difficult to understand. The radiations that emanate from the sun are simply quiverings and pulsations of a mysterious, infinitely rare substance known as the luminiferous ether. The shortest of these "light" radiations when they enter our eyes produce the effect of blue light upon our consciousness. The longest quiverings or waves cause us to perceive red light. The waves that produce these results are neither blue nor red.



Waves Which Produce Blue Rays Are Interrupted by Dust Motes, Reflecting Them in All Directions. This Causes the Blue Color of the Sky



Light Waves Producing Red and Yellow Rays Are Strong Enough to Pierce Dust and Continue on Their Way

those beings fortunate enough to have lived at one time in the Kingdom of Dust.

Were one to look at a dustless atmosphere at midday, the sun would be vis-

Color exists only in the mind. The same thing is true about sound waves. A bell does not give forth anything other than quiverings, called sound waves. These waves are interpreted

by the brain as sound. Were there no eyes nor ears there would be no light and no sound. Were there no operator who understood and could interpret the clickings of the Morse alphabet, there would be no message—only a series of impulses. The trained Egyptologist reads history where the unskilled layman sees only a strange jumble of odd-looking hieroglyphics. In other words, sound waves have no sound, heat waves are not hot, and light waves are invisible, as we understand each of these different phenomena. They simply affect us so that we feel these different sensations.

It would seem to the ordinary observer who has often seen a beam of light athwart a darkened room from a hole in the shutter on a sunny day, that light is really visible. As a matter of fact it is dust motes that render the light visible. These tiny particles of matter intercept the radiant energy known as light and reflect it directly to the eye. A representation of an experiment that proves the truth of this statement is shown in one of the illustrations. A box divided into two compartments by a glass partition, and having glass windows at both sides and ends, allows a beam of sunlight to pass through its entire length. One of the compartments, A, contains dust-laden air. The other compartment, B, has its sides smeared with glycerine, which soon catches and retains most of the dust motes. The light passing through A is visible. The same beam continuing through B is practically invisible, but becomes visible again after passing through the window out into the dusty air. On a moonlight night only the illuminated part of the surface of the moon is visible. The rays from the sun, from which this illumination is produced, are invisible.

Light waves, as we shall continue to call them, travel at the rate of 186,000 miles per second, the ether being the transmitting medium. Although these waves travel so rapidly, they are exceedingly small so far as wave length is concerned. Those that produce dark red, for example, have a wave-length of only $1/33,000$ of an inch, while the violet-producing waves are only about one-half this length.

Light is made up of billions of wave lengths, each of which is responsible for a different color. While Newton thought that there were only seven colors,—violet, indigo, blue, green, yellow, orange and red,—in reality there are as many colors as there are wave lengths—billions.

The brotherhood of light waves, undulating through the practically empty ether, travels without let or hindrance with equal velocity for all lengths of waves, until the earth's atmosphere is reached. Then the tiny dust particles begin their work of breaking up the brotherhood, and sifting out the short waves from the longer ones. Those that produce the reds and yellows are strong enough to brush aside the motes, and go on their way through the air. To the shorter and feebler quiverings that cause the sensations of blue and violet, these small dust particles are insuperable barriers, causing these latter waves to be reflected in all directions. Some of these violet and blue-producing vibrations enter the eye. As we see an object in the light that comes from it, these innumerable decillions of motes give us the effect of a blue sky.

At sunrise and sunset the reds and yellows are also reflected, as they must pass through a relatively large quantity of air, which, on account of its being so much nearer to the earth's surface, contains the larger and heavier particles of dust.



A Ray of Light Passing Through Two Compartments, in One of Which All the Dust Has Been Removed. The Ray of Light is Visible Only in the Compartment of Dust-Laden Air



"The Time Will Come When Fog Dispellers Will be Put into Operation in New York Harbor"—How the Harbor Would Look During a Fog, if Electrical Fog Dispellers Were Used to Clear a Channel for Ocean-Going Steamships

This dust is capable of stopping and reflecting the outward flight of these stronger waves. Hence the preponderance of reds and yellows in the evening and morning skies.

In 1869, Tyndall demonstrated the cause of the blueness of the sky in his laboratory, by filling a glass tube about a yard long with air at one-tenth the ordinary density, mixed with the vapor of a substance known as nitrate of butyl, which is quite volatile. On passing a beam of light from a powerful arc lamp through this combination, the mixture appeared as a beautiful blue cloud.

Lord Rayleigh investigated Tyndall's experiments by profound mathematical research extending over a long number of years, and satisfied himself that Tyndall's explanation is correct. He estimated that the size of the particles that produce the reflection of blue light are less than one-thousandth of an inch in diameter. Some of these particles are motes of dust, others are water, but most of them are composed of particles of oxygen and nitrogen. Professor See, noting that the blue sky continues for about an hour and fifteen minutes after sunset, has made this the basis of a trigonometrical calculation by which he avers that the height of the atmosphere is in the neighborhood of one hundred miles.

Dust is responsible, to a large extent, for the formation of fog. Fog is defined as "the aggregation of a vast number of minute globules of water in the air near the earth's surface, usually produced by the cooling of the air below the dew point, whereby a portion of its vapor is condensed."

This is true, of course, but in order to produce the condensation, there must be small nuclei, or particles of dust, around which as centers the water may condense. In large manufacturing cities like London and Pittsburg, fog is an important factor in industrial life. Many efforts have been made to devise some simple, inexpensive means by which fog may be dispelled. As yet, the use of electrical discharges of high-tension currents seems to be the most

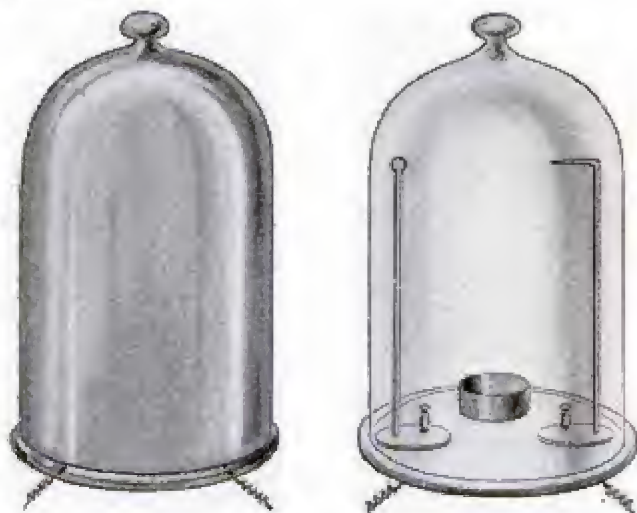
practical solution of the problem. Tyndall was the first investigator who sought to disperse this foe of commerce. In 1870, he discovered that heat applied to dust-laden air would free it from particles. This fact may readily be demonstrated by holding a red-hot poker under a beam of sunlight filled with glancing dust motes. Immediately, like magic, a space is cleared of the dust. Some scientists explain this phenomenon by stating that the dust particles were really water, and hence dissipated into invisible vapor by the heat. This would not account, however, for the disappearance of the motes, which were not water, nor could it be accounted for by convection currents of hot air, as Lord Rayleigh in 1880 showed that a lump of ice held under the dust beam would produce exactly the same effects as the hot poker.

There is no doubt that a molecular bombardment of the dust particles was caused in some manner or other, but no one knew the precise nature of the bombardment. Finally, in 1883, Professors Lodge and Clarke determined to try the effect of an electrical discharge. A bell jar was fitted with wire rods between the terminals of which an electrical brush discharge could be produced. The jar was filled with an artificial fog made from all kinds of substances, such as tobacco, paper, ammonium chloride and lead fumes. The discharge was permitted to take place between the points, and almost immediately the bell jar became free of fog. A practical test of this method of dispelling fog was made by Lodge a few years ago on a fairly large scale in the quadrangle of the University of Liverpool. On a foggy day, when the fog was so dense that one could not see a foot into it, the trial was made. The wire network of the apparatus was connected up to a source of high-tension electrical current. Instantly the fog was dispelled for a considerable space in the vicinity of the wire, thus demonstrating the practicability of Lodge's method of fog dispersion.

The time will come when such fog

dispellers will be put into operation in places where their economic value would be highest, such as in the entrance to New York Harbor, along the Chicago River, the Thames, and other places where their use is clearly indicated. Possibly in the far-distant future, all of our large cities may have their Bureaus of Mists and Fogs, enabling us to disperse at will the occasional fog and the perennial smoke which envelops us.

Dust is frequently the cause of explosions, as the terrible accidents in coal mines have so often admonished us. The small particles of dust thrown into the air by the blow of the miner's pick, wander up and down through the various rooms and entries and shafts, and become under certain conditions as dry as powder, and likewise as explosive as gunpowder. How many thousands of lives have been lost in this way the statistics of mine casualties of this country and elsewhere will plainly show. Government experts are studying this serious problem with the greatest care, and they have already proposed plans, which are apparently giving relief.

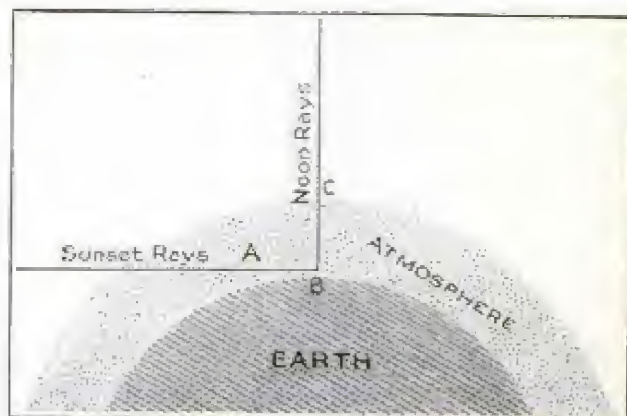


Test of the Effect of Electrical Discharge on Fog. First Jar Filled with Artificial Fog. Second Jar Shows Clarifying Effect of Electrical Discharge

Accurate statistics compiled by the United States Geological Survey show that from 1890 to 1906, 22,840 men were killed in the coal mines of the United States. Of this number it has been estimated that at least 11 per cent were due to explosions caused by dust

or gas. Many so-called gas explosions are really due to dust, as recent research has revealed.

Dust explosions occur quite fre-



Red and Yellow Rays are Reflected at Sunrise and Sunset Because at Those Times These Light Waves Travel Through Enough Dust to Reflect Them—Line A-B is Longer Than B-C

quently in flour mills and in other factories where fine dust is generated. The greatest care must be taken to prevent the smallest spark of fire in the room where the dust is flying.

In at least one respect, dust is a public benefactor. It is an exceedingly important agent in the transfer of vegetable organisms, seeds and spores, to the waste and barren places of the earth. "Perhaps," says M. Barral, a distinguished French scientist, "it would be correct to say that the air remaining in a condition of purity equal to that which is sometimes obtained in our laboratories would strike the earth with barrenness. Perhaps, too, it is necessary for the maintenance of life on our planet that a host of impurities should be incessantly carried hither and thither by the winds and storms from the places where they are produced to regions where germs are waiting to be fructified."

Dust is undoubtedly a fertilizer. Particles of phosphoric matter are often detected in the atmosphere, transported from regions where phosphate of lime is abundant. As each crop of grain draws on an average of $17\frac{1}{2}$ lb. of phosphorus per acre from the soil, we may readily perceive the importance of a new supply of this invaluable element.

We can understand also why it is that races like the Arabs, who never attempt to fertilize their lands, are necessarily nomads. They live in one place long enough to exhaust the soil, using up the chemical elements essential to

the production of grain and other food-stuffs, and then move on to pastures new. In this manner they allow the soil, through dust and other natural agencies, to recover itself for future tillage.

JEWELED RING GUARD

A ring guard that is ornamental as well as useful is shown in this illustration. By its use, valuable rings are



Prevents Loss of Valuable Rings

linked up with each other by fine chains thus lessening the risk of their being lost or stolen from the hand.

WHAT AN 8.3-IN. SNOWFALL MEANS

In February last, Chicago experienced the most severe snowfall since 1907. Snow fell all over the city to a depth of 8.3 in. The magnitude of this fall may be appreciated when it is stated that the total weight of the snow that fell within the area of Chicago was about 15,000,000 tons. If this snow were melted into water, it would fill an immense reservoir $2\frac{1}{4}$

miles long, $\frac{1}{4}$ mile wide, and 30 ft. deep. If the energy of the snow, falling from the sky over Chicago, could be harnessed and made to do useful work, it would equal in amount the energy supplied by a 5,000-hp. engine working day and night for a whole year.

SAVING BOYS FROM "BLIND ALLEY OCCUPATIONS"

The education authorities of Liverpool, Eng., have established a scholars' employment bureau for the purpose of finding adequate positions for both the boys and girls when they leave school. The most important feature of the idea is to do away with what is called "blind-alley occupations," that is, occupations which do not admit of advancement, such as telegraph messengers, errand boys, van boys, etc. After two or three years of this work, the places are filled with younger boys, the older ones being dropped, little, if any, better off than they were at the time of entering upon such duties.

In the bureau scheme, the schoolmasters, who, in conjunction with the education committee, have to do with the boys and girls until they are at least 14 years of age, continue what may be called a post-graduate interest, finding them positions and watching out for their welfare. Careful discrimination is made between employments which have a future and those which do not. Great care is also taken to see that the natural tendencies and abilities fit the child for the position into which he goes. Thus a boy with a mechanical turn of mind would not be recommended for an office position, and vice versa.



The New Type of Chicago Elementary School with Large Assembly Hall and Gymnasium on Ground Floor

CHICAGO'S SOCIAL-CENTER ECONOMICAL SCHOOLS

Chicago's new elementary school buildings, evolved after much study, are called social-center schools because the design is such that the assembly hall and gymnasium may be opened for neighborhood social gatherings in the evening without throwing open any other part of the building. They are called economical school buildings because, through simplicity in construction, without loss in architectural beauty, they are costing about \$50,000 less than the old expensive structures, which have no more accommodations.

The Trumbull school, for instance, the contract for which was let in 1908, has 20 class rooms, with a capacity of 1,000 pupils, and cost \$218,525. The social-center, economical school shown in the illustration has 24 class rooms, seats 1,200 pupils, and will cost not more than \$165,000. The saving is \$53,525.

The change in style of building, according to the architect of the Chicago Board of Education, is along lines of simplicity and strength of construction, keeping in mind beauty of outline, harmony in color, etc. The rooms have ample light, the most modern heating and ventilating apparatus that can be procured, and a thorough school equipment, nothing being eliminated that would decrease the safety, limit the

comfort of the pupils, or impair the educational efficiency of the school plant.

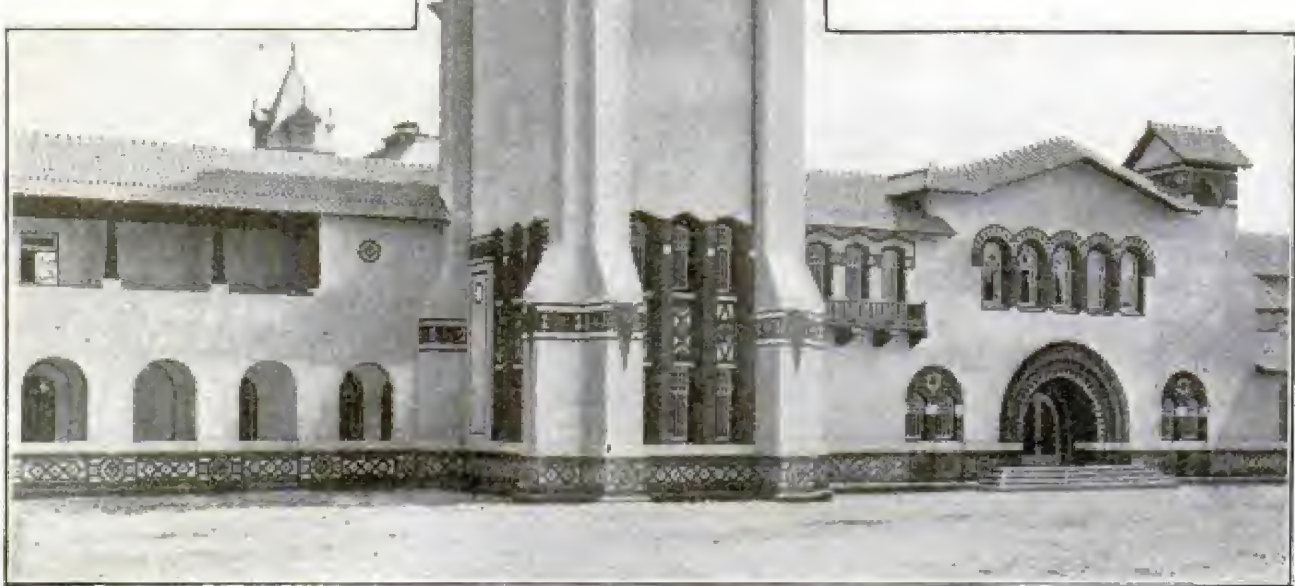
The architectural feature of the new schools, six of which are now under construction, is the combined assembly hall and gymnasium, occupying the one-story stone extension. This feature was evolved in carrying out the social-center idea. There are four entrances by which the pupils may be admitted to the gymnasium and assembly room during the day, but at night the main school structure is completely shut off, admittance being through the main entrance of the extension. Ordinarily the gymnasium is separated from the assembly hall by sliding doors, but, when these are pushed back, the whole becomes one large hall with a capacity of 1,000 persons.

The new buildings have no basements. Behind the assembly hall and gymnasium, in what may be called the school building proper, is a long wide corridor, and back of this are lavatories, coat room, etc. The heating plant is contained in a separate building at the back. The only study or work rooms on the main floor are the manual-training room, the kindergarten, and two class rooms. The second and third floors have 10 class rooms each. A wide, well-lighted corridor

runs through the center of each of the upper floors, with five class rooms on each side.

The social-center school idea is new in Chicago. Its purpose is not only to provide entertainment one or two evenings each week for the pupils, thus keeping in touch

with them out of school hours and influencing them towards a higher standard of amusement, but also to bring the parents and adult friends of the children into closer touch with the school influences. The entertainments will include illustrated lectures, musical evenings, etc.



NEW CALIFORNIA STATE NORMAL SCHOOL

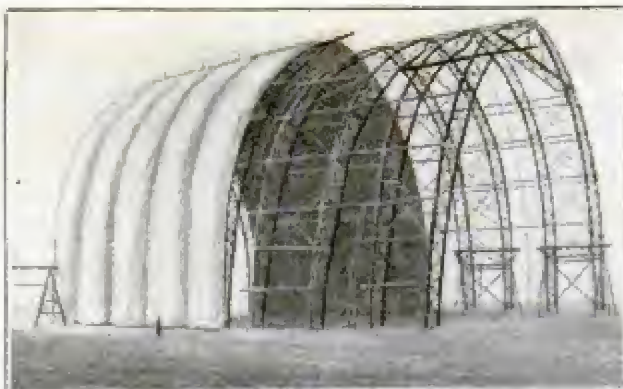
In contrast to the simple architectural treatment of the Chicago schools is the new state normal school at San Jose, California, designed by the state engineering department. Brick and faience tile are used as an exterior decoration for the concrete building. The school is built in the shape of a rectangle, broken up slightly with pavilions and buttresses. The exterior color scheme is gray, red and green, red tile being used for roofing. The tile and red brick used as inlay make a pretty contrast to the dull gray cement finish.

PORTABLE AIRSHIP HANGAR

The new portable German airship hangar shown in these illustrations is unique in that it may be quickly erected or taken down in sections without the

falsework or other auxiliaries usually required for such work.

The great steel-arch trusses are made in sections or panels about 20



Remarkable Airship Hangar with Framework Complete and One End Canvas Covered



The Steel Frame is Erected a Step at a Time, Therefore the Lop-Sided Appearance

ft. long. The top sections alone make a small arch, and the next lower sections added to them make a somewhat larger and higher arch, the adding of sections continuing until the full height and span are reached. By setting up the crown sections with the tie rod holding them, then raising one side of the frame high enough to permit inserting the next lower section, and then tipping the structure in the opposite direction to insert the second section on the other side, and so on progressively, the whole is at last erected without staging. Special gantry frames, 25 ft. high, provided with chain blocks, are used for the lifting.

The completed structure has a span of 108 ft., a height of 98 ft., and a diameter of inscribed circle of 65 ft. The covering is canvas.

THE "KISS OF DEATH" IN COTTON MANUFACTURE

A custom in cotton factories necessitated by the old-fashioned weaver-room shuttles is grimly called the "kiss of death," because of its transmission of infectious diseases. The so-called "kiss of death" is the sucking of the thread through a hole in the shuttle, and, according to the Journal of the American Medical Association, it has doubtless been responsible for the carrying of tuberculosis and other infections throughout all the generations in which it has been used.

A bill has been introduced in the Massachusetts legislature to compel all mill owners to abandon the old shuttle in favor of a new one which does not require this lip contact.

CURE DRUNKENNESS BY EYE TREATMENT

A craving for stimulants may frequently be cured by a visit to an eye specialist, says a well-known oculist. The theory is that unsuspected strain on the eyes leads to nervous disorders which result in an overindulgence in intoxicating liquor.

TELEPHONE SAVES LIFE OF WESTERN LINEMAN

Presence of mind in tapping a telephone line recently saved the life of a



How a Snowbound-Lineman Secured Assistance with a Portable Telephone Outfit

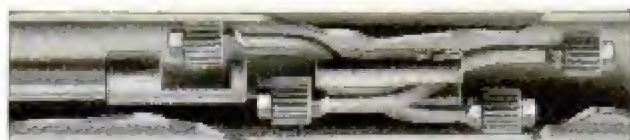
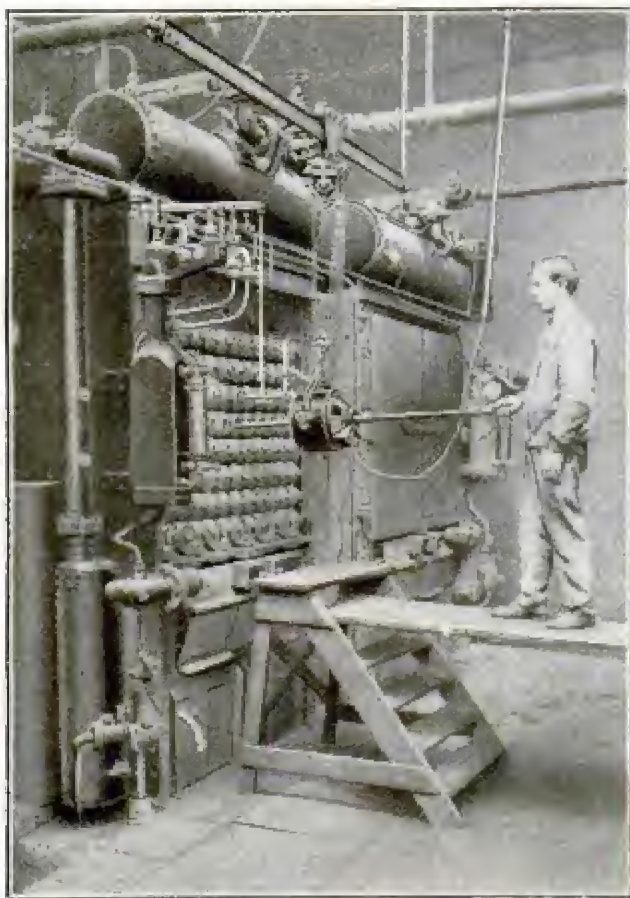
lineman in an out-of-the-way place during the snowy season.

After finishing his work on a pole line near "The Hump," a precipitous mountain in the state of Washington, a telephone lineman essayed to make a short cut home by climbing up the mountain side to the track of the Northern Pacific Railway. His climbing started a snowslide, and but for the fact that he happened to strike a telephone pole, he would have been dashed to his death over the cliffs below. Struggling out of the snow, he bethought himself to climb up the pole and tap the wire with his pocket telephone set. A freight train was dispatched to his assistance, and he was finally rescued by a party of linemen who worked their way hand over hand along the pole line by means of a lineman's swinging seat suspended on the telephone cable.

ⒸThe gates for the locks of the Panama Canal will require 58,000 tons of steel.

FRENCH MOTOR-DRIVEN FLUE CLEANER

An electrically driven rotary cleaner for boiler flues, invented by an employe of the Post and Telegraph De-



Electrically-Driven Flue-Cleaner in Operation and the Rotary Cleaning Head

partment, Paris, has been successfully tested out on various boilers belonging to the French government. The cleaning head, mounted on the end of a shaft, has four rotary cutters so arranged as to always be parallel with the tube. The electric motor is mounted on the other end of the shaft as shown in the larger illustration.

Chinese carry on 75 per cent of the business done in the Philippine Islands, there being more than 8,000 Chinese merchants in the archipelago whose business capital amounts to more than \$25,000,000.

VALUELESS PEBBLES ARE TRADED FOR GEMS

One of the many curious trades that depend upon successful imposition is that of the seaside lapidary or gem cutter who secretly trades inexpensive gems for absolutely worthless pebbles. Such a transaction proves profitable at some of the English seaside resorts. The victim or victims are shown gems which are claimed to have been picked up on the shore and polished by the gem cutter. Then they start out in search of gems and carry to the cutter pebbles which he convinces them are gems. They leave the pebbles to be cut and the gem cutter sends back, in return for the valueless pebbles, topazes, aquamarines and such inexpensive gems, charging a price for cutting which gives a handsome profit on the transaction.

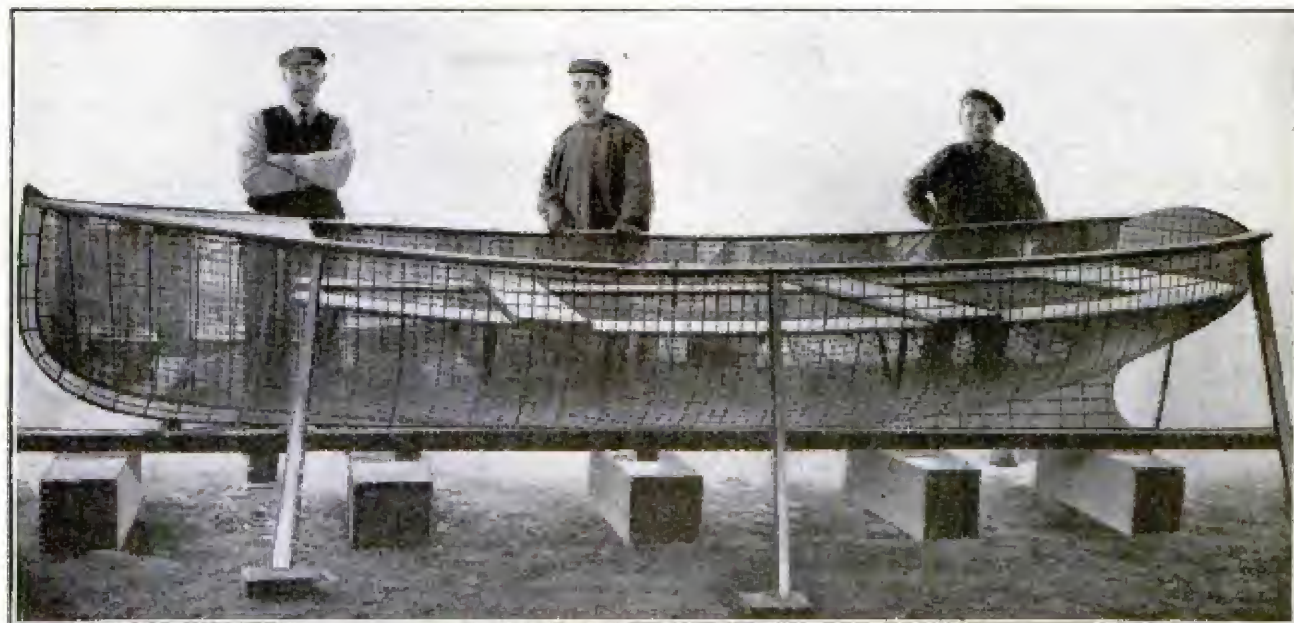
KENTUCKIAN MAKES SLEIGH OF DRYGOODS BOX

Probably the strangest sleigh ever seen on a city street was that belonging to an old Kentucky mountaineer who drove into Cincinnati recently. The sleigh was made from an old drygoods box with runners made of hickory. A window sash served as a wind break. With the bottom of the box filled with straw and hot stones, the old mountaineer was able to withstand the wintry blasts and enjoy his city trip in comfort.



Kentucky Mountaineer Riding in His Home-Made Sleigh

DUTCH CONCRETE MOTORBOAT



Ready for the Application of Concrete

The novel concrete motorboat shown in these illustrations is one of many made by a concern in Holland. This boat is about 15 ft. long and 5 ft. wide, and, driven by an American 3-hp. engine, has a speed of 7 miles an hour.

The reinforcing is wire network, the concrete being



Concrete Motorboat Built in Holland

applied on both sides. The deck and seats are the only wooden parts used in its construction.

Concrete boats, such as canal boats and barges, were first made in Italy, but are now being constructed to some extent in the United States, as well as in many European countries.

UNCERTAINTY OF RADIUM

Although radium has been acclaimed as a renewer of life because of the experiments of Professor Petit, in France, in which an old horse apparently received a new lease of life after injections of radium, other scientists draw attention to the uncertainty of its behavior.

The experiment has been frequently tried both on animals and human beings, according to Sir William Ramsey, the famous English scientist. He tested the possibilities on cats, all of whom became emaciated after a short

time and eventually died. Of eight persons suffering from cancer who received injections, only one recovered, so that it is difficult to say what the effects of the radium were, if any.

On the other hand, external applications of radium undoubtedly effect a cure of certain kinds of cancer.

ⒸA new form of electric motor is prevented from overheating by blowing through its coils a current of cold air which is passed through a water-cooling apparatus in the base of the motor.

A DIRECT MEASURER OF ILLUMINATION

A boon to amateur photographers is the handy portable photometer de-



Portable Electric Photometer in Use

signed by an English inventor and shown in use in the illustration. This simple instrument, which measures 7 by 3½ by 2 in. and weighs less than a pound, does away with the spoiling of plate or films by underexposure or overexposure, for it enables a direct measurement to be made of the illumination in any direction at any place, and the time of exposure and the stop aperture for the lens may be chosen accordingly.

This photometer contains a tiny electric lamp which throws a beam of light on to an inclined screen, the angle of which may be adjusted by a small milled head. A mirror, from the central portion of which the silvering has been removed, reflects an image of the screen into the eyepiece of the instrument. Through the desilvered part of the mirror is viewed the object whose illumination is to be determined. When the milled head has been turned until the illuminations from the lamp

and the object are equal, the illumination of the object may be read directly on a small scale.

BOHEMIANS MAKE BUTTER FROM COCOANUT OIL

"Vegetable" butter, made from coconut oil, eggs and a small percentage of cream, is being manufactured in Bohemia where it sells for less than half the price of creamery butter. The claim is made that this butter has an agreeable flavor, that it is not injurious to health, and is excellent for cooking purposes. It is prepared in two forms, soft, and in firm cakes. The principal ingredients are coconut oil and the yolks of eggs. It sells at 14 cents a pound. Creamery butter sells, in Bohemia, for 35 to 38 cents a pound, and farm butter from 31 to 33 cents a pound.

ACROBATIC FREIGHT CAR

While the train was running at a moderate speed, the steel sheet bars with which this car was loaded shifted so seriously as to cause it to jump the track. The car tumbled down a bank 20 ft. high, made a complete turn in which it emptied itself of its load, and when it landed right side up in the bed of the stream, one of the trucks was found resting on the floor as shown in the illustration.



This Freight Car Emptied Itself by Turning a Somersault and Then Picked Up One of Its Own Trucks



Roof of Combined Aerial and Automobile Garage as Ascending and Alighting Surface for Aeroplanes

COMBINED AERIAL AND AUTOMOBILE GARAGE

If present plans are carried out, a combined aerial and automobile garage, one of the finest structures of its kind in the world, will be erected on the Parkway, Cambridge, Mass., at a cost of \$200,000. The roof, which will be perfectly flat, will provide a surface from which to ascend and alight.

Hangars on the roof are to be connected with the machine shop and garage below by stairways. The necessary skylights will be flush with the roof, and sufficiently strong to bear any weight required.

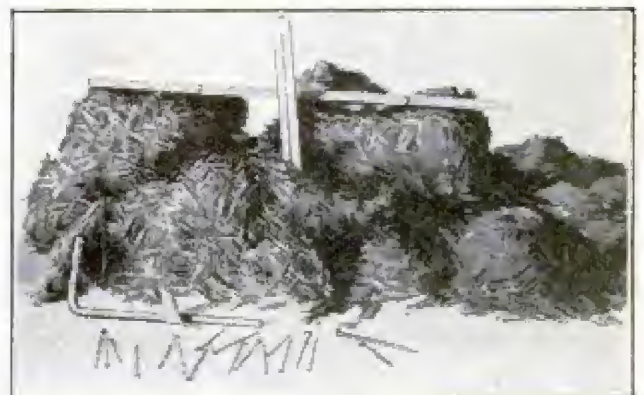
REINFORCED TELEPHONE APPARATUS

Users of desk telephones have to be careful not to knock off the apparatus on to the floor, as the ordinary receivers and transmitters are very brittle and break easily.

A new form of reinforced construction for these parts has recently been introduced to overcome this objection. The mouthpiece and earpiece are made of a metal-ribbed frame, around which the rubber insulation is forced under high pressure. It is almost impossible to break apparatus made in this way, and rough usage results only in very slight chipping around the edges.

JUNK IN CYLINDER STOPS PUMPING ENGINE

The miscellaneous collection of iron borings, rods, nails and other junk shown in the illustration was found in the low-pressure cylinder of a large pumping engine at Atlanta, Ga., when the engine was overhauled recently on account of valve trouble. No less than 59 lb. of scrap was taken out of the cylinder, which measures 90 in. in diameter. The engine had been doing half-time duty for about six months, and it is remarkable that serious damage did not result sooner. As it was, one of the valves jammed and the stem was badly bent. It is supposed

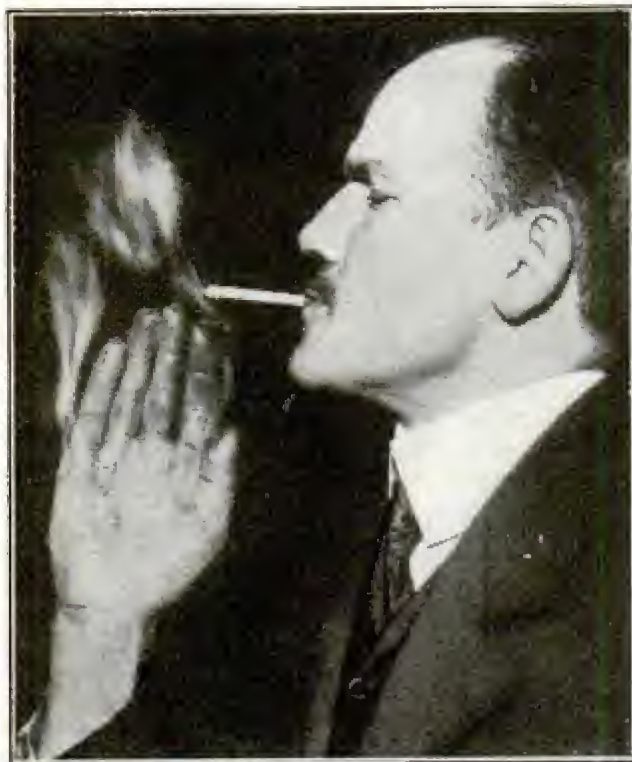


59 Pounds of Junk Taken from Engine Cylinder

that the ports of the intermediate cylinder had not been cleaned out properly when the engine was erected, and that the junk came from this source.

HEAT DOES NOT AFFECT THIS SKIN

Benzine, poured over the hand of an ordinary human being and set on fire, would have a very painful, if not dis-



This German Performer Saturates His Hand with Benzine and Sets It on Fire

astrous, effect, yet a German vaudeville performer does this trick at every performance. He also piles gunpowder on the palms of his hands and sets it on fire. It is claimed that he does not prepare his skin in any way for these tricks, but has practiced until his skin is practically insensible to heat.

OIL-BURNING ENGINES IN NATIONAL FORESTS

At the recent meeting of the Western Forestry and Conservation Association announcement was made that recommendations were to be presented to the Forestry Bureau that oil-burning locomotives be specified in all future grants of franchises to railroads crossing national forests.

In the summer of 1910, according to W. B. Greeley, district forester, nearly 950 fires started within 200 ft. of the rights of way of the Great

Northern and Northern Pacific railroads in the national forests. Both roads burn coal, and Mr. Greeley is convinced that 90 per cent of these fires were caused by engine sparks.

On the Milwaukee line, which uses oil-burning engines to pull its regular trains through the forest districts, not a fire was discovered that was not traceable directly to coal-burning engines used on wreck trains or steam cranes.

DOG A VALUABLE AID TO LONDON CHARITY

"Brum," the handsome Newfoundland dog that is a familiar figure to all travelers through the Euston station, in London, has just been given a medal for faithful service because he has collected the sum of \$1,000 in small amounts for the Long and North-Western Railway Servants' Benevolent Fund. "Brum" made friends with everybody that came his way and this quality of his was what first suggested his being used as a collector for the railway employes' relief fund. A crescent-shaped box was made to fit on his back with straps. A slot was made in the top of the box, large



"Brum," the Newfoundland Dog Decorated for Service as a Collector for Charity Contributions

enough to receive coins and bills, and the dog took his stand in the station where the crowds were thickest.



Ruins of the Giant Scenic Railway Wrecked by Wind at Denver. Fell Like so Many Dominoes

WIND WRECKS AMUSEMENT-PARK STRUCTURE

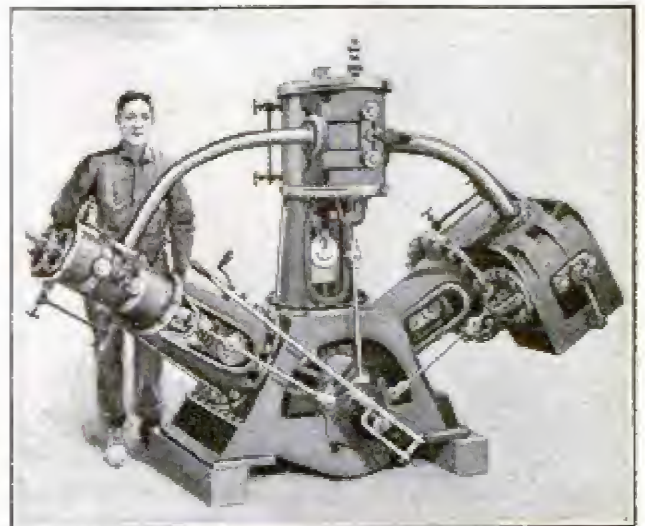
During a severe windstorm in Colorado recently, the big new \$20,000 scenic railway being constructed at a large amusement resort near Denver, collapsed, and was completely destroyed. The fall was most spectacular. As the first section collapsed, it fell against the next bearing, and so on from one end to the other like a long string of huge dominoes. The falling timbers severed the telephone and feed wires of the interurban railway, blocking traffic and communication for several hours.

SIMPLIFIED MARINE ENGINE

A southern engineering plant is building a line of remarkably simple triple-expansion marine engines, ranging from 150 to 700 hp., especially adapted for tugs and small single-screw steamers. The simplicity is such that two cranks, four main bearings, three links, five eccentrics, five straps and three eccentric rods are eliminated, the

result being that maintenance is reduced to a minimum, while efficiency is increased by a reduction of friction.

The engine shown in the illustration has cylinders 9 in., 14½ in., and 25⅝ in. in diameter by 14-in. stroke. It is designed for a working steam pressure of 250 lb., and 300 revolutions per minute. Piston valves on all cylinders are easily operated and reversed by a single eccentric valve gear.



Two Cranks, Four Main Bearings, Three Links, Five Eccentrics, Five Straps and Three Eccentric Rods Eliminated in This Engine

COMFORTABLE FOOT MUFFS FOR MOTORISTS

Muffs are ordinarily associated with hands, but English clothiers are now featuring foot muffs as part of their



Two Types of Muffs for Motorists' Feet

regular stock. These muffs are designed especially for motorists, and are made of astrakhan, and seal, brown bear and many of the other furs used in the making of ordinary muffs. Many of them are lined with thick white wool.

TRANSFERRING MAILS FROM LINER TO MAILBOAT

The discharge of mails is one of the first things to be rushed through when one of the great transatlantic liners draws into the harbor at New York. The accompanying illustration shows a mailboat that has just drawn along-



Mailboat Receiving Mails from Ocean Liner by Means of Chute

side, and the chute by means of which the transfer of mail is accomplished.

WHISTLING CLAIMED TO STOP SNORING

Whistling, according to an article by an English physician, in the Daily Mirror, London, is a preventive of many ills, and also a sure means of stopping snoring. If a person sleeping in the same room with you commences to snore, whistle softly, and, if the London physician is right, the snoring will stop.

The London physician claims that it has been proven that persons having a tendency to bronchitis and pneumonia should be encouraged to

whistle, as children who whistle are least troubled with these diseases. Whistling strengthens the lungs and throat, develops the lips, teaches breath control and strengthens the face muscles. Persons who are apt to lose their "wind" when climbing hills are advised to whistle loudly at every second step, the assertion being that it will soon cure them of breathlessness.

NATIONAL TOURING OFFICE

An organization for assisting tourists has just been inaugurated in Paris, under the title of the French National Touring Offices. The committee consists of high government officials, members of chambers of commerce and railroad managers, with the minister of public works at its head. The object is to centralize and place at the disposal of the public all necessary information for traveling in France. It is hoped that many attractive parts of the country, which at present are not well known to foreign visitors, will be thus advertised.

Can ingenious accessory for automobilists is an air-exhausted bulb which glows when the high-tension current from the spark coil or magneto passes through its metal electrodes. It is used for testing the sparking.

THE MAKING OF ARTS-CRAFTS LAMPS

By JOHN D. ADAMS

PART IX—SHADE FOR DROP LIGHT

THIS is a shade of simple yet rather attractive pattern that may be used on any ordinary drop light, and is also well adapted for use in a mission chandelier, one of which will be next described. The same outside and general dimensions may be retained, while any desired design may be substituted for the simple cross-bars shown. A monogram, college initial, or some heraldic device may often be worked up in an artistic manner. Accurately lay

out the design decided upon on a sheet of rather heavy flat paper, and after cutting it out with a sharp knife mark it off four times on the sheet of cardboard, which will have to measure at least 12 by 28 in. Proceed rather slowly at first with the cutting out of the cardboard, so there will be no danger of the knife slipping.

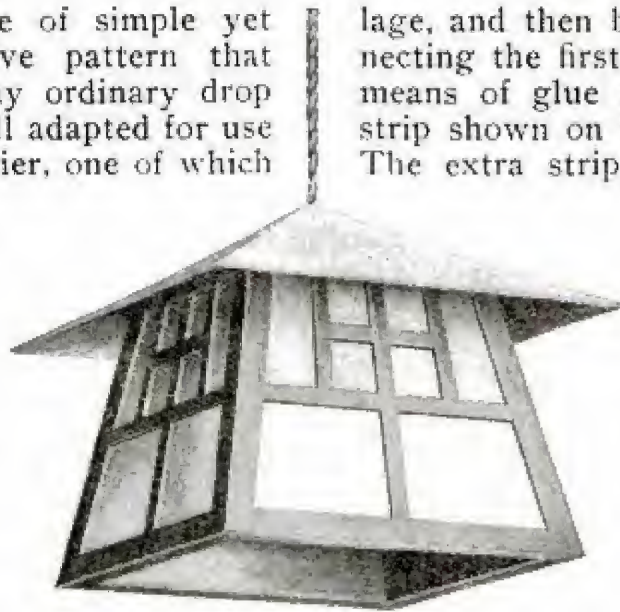
Any frayed or torn edges should be smeared with glue and sandpapered smooth when dry. All the bends are indicated by dotted lines, which should be scored with the knife on the outside, but for no greater depth than will allow a good sharp bend. Attach the colored paper with mucilage,

and then bend into shape, connecting the first and last sections by means of glue applied to the extra strip shown on the left-hand section.

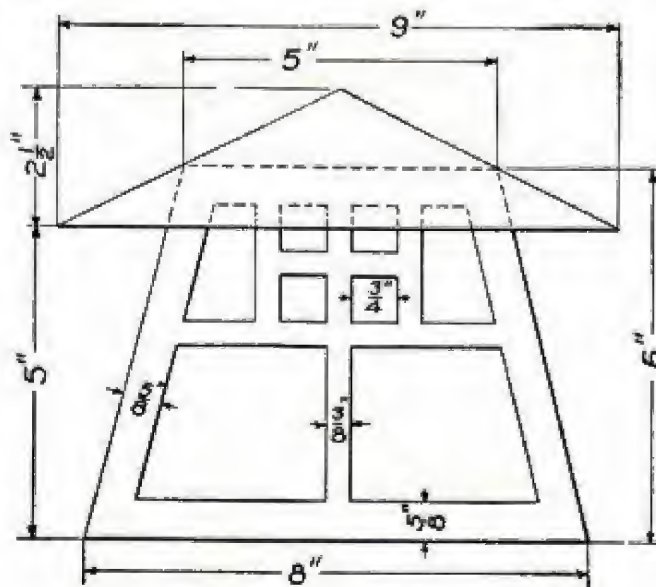
The extra strips on the four lower edges should all be bent inward and connected at the overlapping corners with paper fasteners. The pattern for the top, which is next in order, should now be marked off and cut. Bend into shape and fasten the first and last sections with

glue applied to the extra strip shown. All bends should finally be bound with passe-partout tape. Bend the extra strips at the tops of the four sides inward to an angle corresponding to the slope of the top, and then fasten on the top by means of paper fasteners and glue. Paint the entire framework and top a dull black. If the light is not controlled by a wall switch and

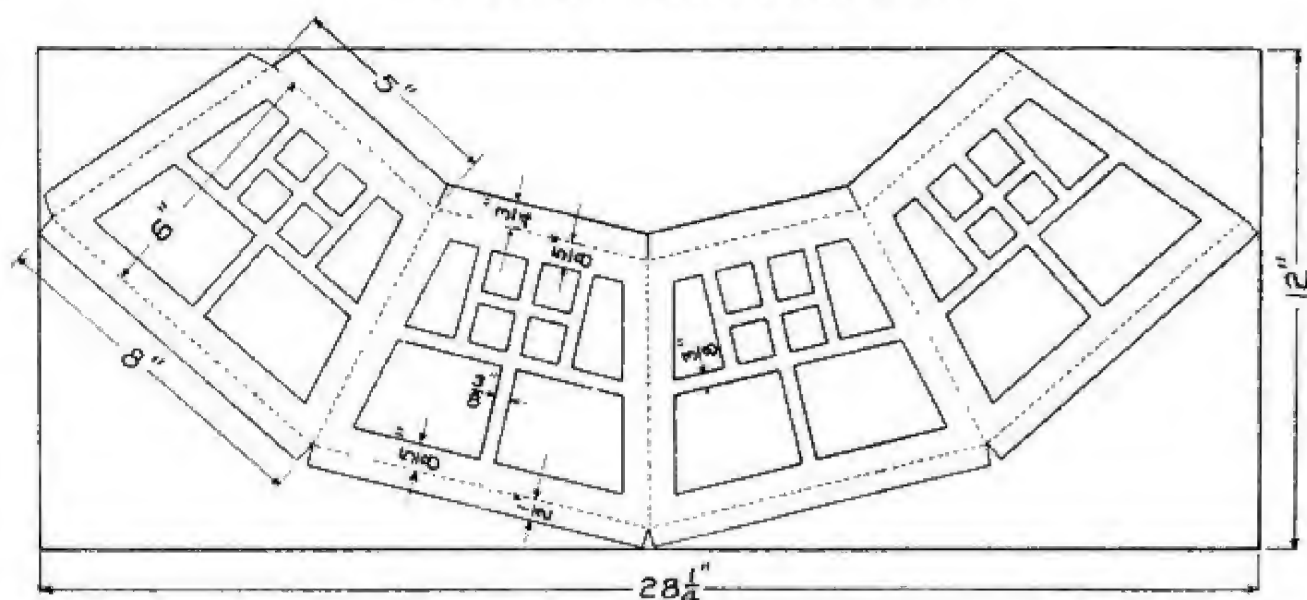
only an ordinary socket is available, a $1\frac{1}{2}$ -in. hole will have to be cut in the top of the shade in order that the socket may protrude from the operating key upward. Four small strips of tin should be provided and one end of each clinched through the top of the shade and the



Shade Complete

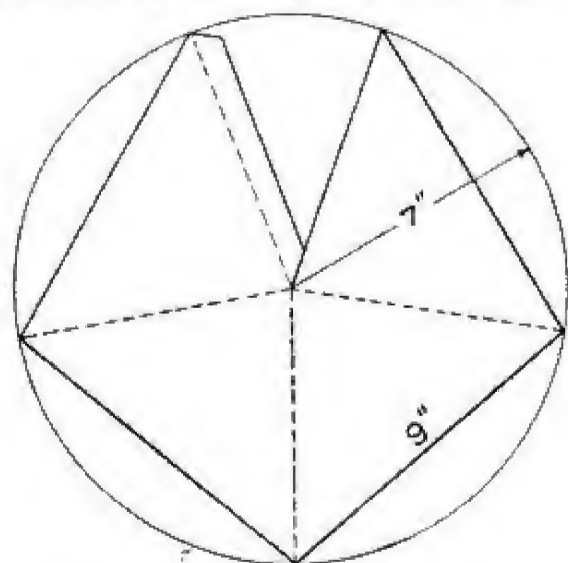


General Dimensions of Shade



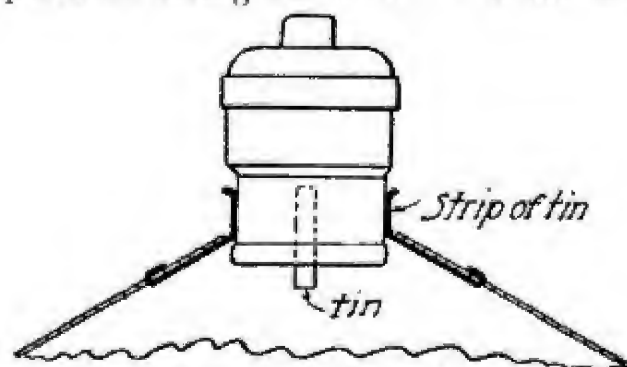
PATTERN FOR THE SHADE

other end bent upward so as to fit along the socket. The shade is then attached by binding the four upward



Pattern for the Top

projecting ends to the socket with a piece of string or wire. If some in-



One Method of Attaching Shade to Socket

ulating tape is at hand, it can be used instead of the string or wire.

THE HOMESTEADING OF ENGLAND

An organization called the Land Union has launched a scheme in England the purpose of which is to practically colonize that country with small homesteads, which are to be paid for on the installment plan. Only 50 or 60 cottages will be built the first year, but if the plan works as expected, the number will be increased year by year.

The first 12 homesteads to be provided were awarded to men picked from the great number of old army and navy men, policemen, and ex-civil service men who filed applications, all of whom have small pensions. Plans were made out showing the selected sites and neighborhoods, and the designs of the cottages and buildings, along with statements of the exact amount of costs and the annual payments which will purchase the homesteads over a course of years. This information was then placed before the selected men, who were permitted to modify them as would best suit the size of their families, the amount of the installments they could pay, and the nature of the agricultural or horticultural work they wished to practice. The monthly or quarterly sums the families thus provided with homesteads will have to pay, will scarcely exceed the amounts ordinarily paid

out in rent. The majority of the homesteads will not have more than three acres of land, the idea not being to provide a complete livelihood to the men, but to increase the income and provide a good home in the country.

ASH-SIFTING HAND-SHOVEL

This hand ash-sifter is used in France, where the open fireplace is still the chief means of heat. It is for use before removing the ashes from the room in which the fireplace is located, which allows of the unburned pieces of coal being immediately replaced in the fire basket. Only one half of the shovel is perforated, the



Saves the Unburned Coal

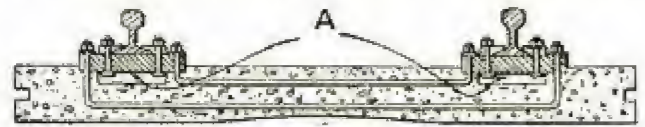
unperforated half serving to hold the ashes after the unburned coal is recovered.

CONCRETE TIE WITH WOODEN RAIL-CUSHIONS

Elasticity of the bed for the rails is the important feature of a concrete tie invented by an engineer of Pulaski, Ill., now being tested by the Illinois Central Railroad.

Over a groove at each end of the concrete tie, is placed a wooden block, varying from 3 to 6 in. in thickness, and held in place by the reinforcing rods which run through the tie. These reinforcing rods, after being bent to project from the top of the tie, are threaded to receive a nut, and, in order that this may not work off, the end of the rod is slotted, which causes it to spread. The grooving of the concrete ties leaves an open space under the blocks at the point of attachment of the rails, and this, according to the inventor, gives the blocks a yielding bed, which will prevent undue shocks.

The rails are fastened to the blocks by means of clips, which extend over



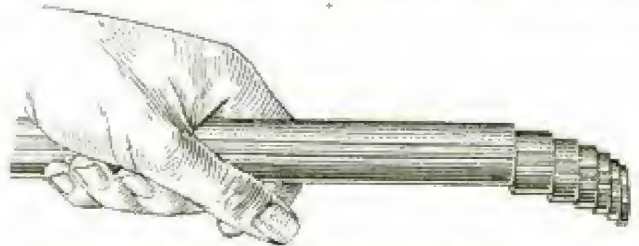
Manner of Constructing New Concrete Tie—
A, Wooden Blocks

the flanges and are secured by bolts passing through the blocks. The ties weigh 600 lb. each.

CORRECT TO THE HUNDRED-THOUSANDTH OF AN INCH

It passes human comprehension what the one hundred-thousandth of an inch really means. One can perceive with difficulty the one hundredth of an inch on a mechanic's steel rule; but the one thousandth of this small division is beyond human ken. Yet mechanics can work to this degree of accuracy.

The illustration shows the holder and distance pieces of a high-grade gauge set adhering to each other, not mechanically or from the effect of magnetism, but from simple atmospheric pressure. They are made correct to the one hundred-thousandth of an inch and fit against each other so closely that the absence of an air film between them permits the atmospheric pressure

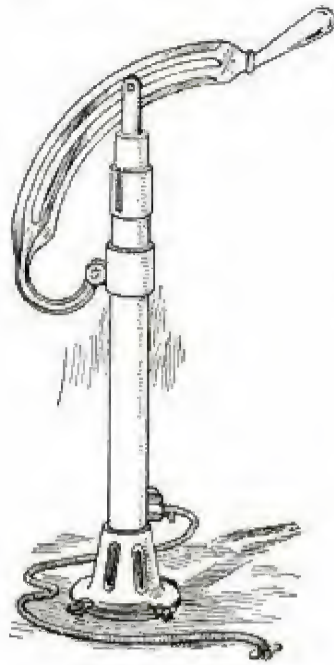


Pieces of Metal Held Together by Air Pressure

of 14.7 lb. per square inch to hold up their weight and prevent them from falling.

A life buoy carrying four electric lights, two above and two below the water, and having sufficient buoyancy to support three men, has been successfully tested in England. It weighs 25 lb., and the batteries will light the lamps continuously for four hours.

FRENCH AIR PUMP FOR AUTOMOBILE



the bottom of the cylinder.

LOCKING WEIGHING TABLES FOR LOCOMOTIVES

Weighing machines are used in all the great locomotive works to determine the weight on each wheel, thus making possible such distribution of the total weight as will result in an easy-running machine which will not be unduly hard upon the rails. The majority of these machines consist of separate weighing tables for ascertaining the load on each individual wheel.

The weighing machine here illustrated consists of 12 such tables provided with a special locking gear, which firmly locks them in position while a locomotive is being moved over them, thus preventing oscillation and shocks during the operation. The locking and unlocking is effected by means of a hand wheel.

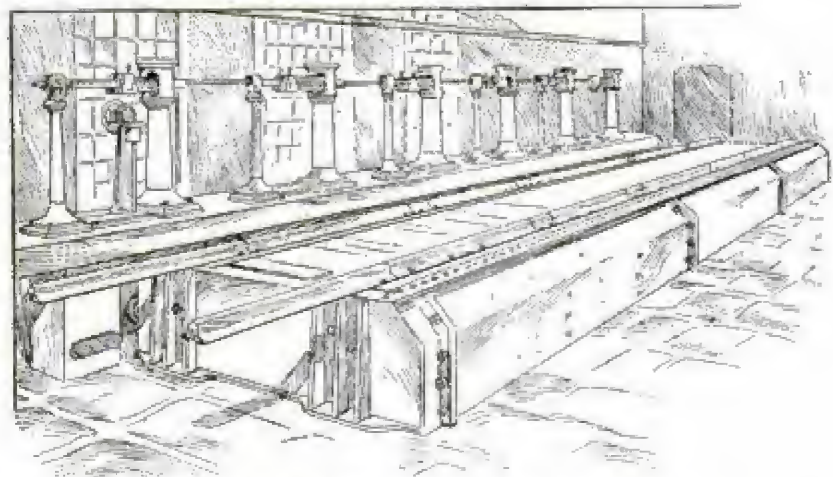
SECRET VAULTS IN HOMES AGAIN POPULAR

The latest fad in home construction is the building of secret safety boxes or vaults in the walls or floors. This is not a new idea, however, but the re-adoption of a feature from the days before the development of banks and trust companies. In some houses the boxes are placed under the floor and are hidden by a cover which is moved by a secret spring, while in other instances, the safe is sunk in a window ledge, under a stair, in the fireplace, or in the walls.

DRIVES TUNNELS BY HEAT AND COLD

Driving tunnels by alternately applying heat and cold is the method proposed by an inventor who has applied for a patent on a new style of tunneler based on this principle.

Almost any method of generating heat may be used, as by burning gasoline, crude oil, natural gas or the like, or by applying electricity. When gasoline is used, air under pressure is forced through a burner and the heated products of combustion strike against the face of the rock which is softened or cracked by the intense heat. Disintegration is completed by shutting off the supply of fuel and forcing cold



Twelve-Table Weighing Device for Locomotives

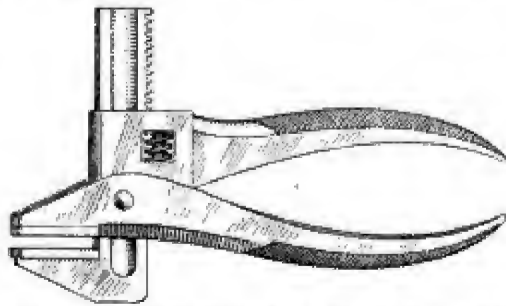
air against the heated face of the rock, which can then be mined by hand or

with a pneumatic tool. Shoveling is practically eliminated by digging the waste rock right into a specially constructed car or hopper.

The chief objection which might be raised against the new method is that the products of combustion would probably have a deleterious action on the workers in the confined space of a tunnel heading. This would be obviated, however, by the use of electric heaters.

EXPANSION PLIERS

The curious-looking tool shown in the engraving combines in a pair of pliers the expansion principle of the monkey wrench. The handles are pivoted together so that they are always the same distance apart, while the lower jaw may be moved in and out by the knurled worm in the same way as a monkey wrench is adjusted. As the pivot is quite near the jaws, the leverage is much greater than in the ordinary variety of pliers. Thus a greater gripping power is possible, and this



Screw-Wrench Principle Applied to Pliers

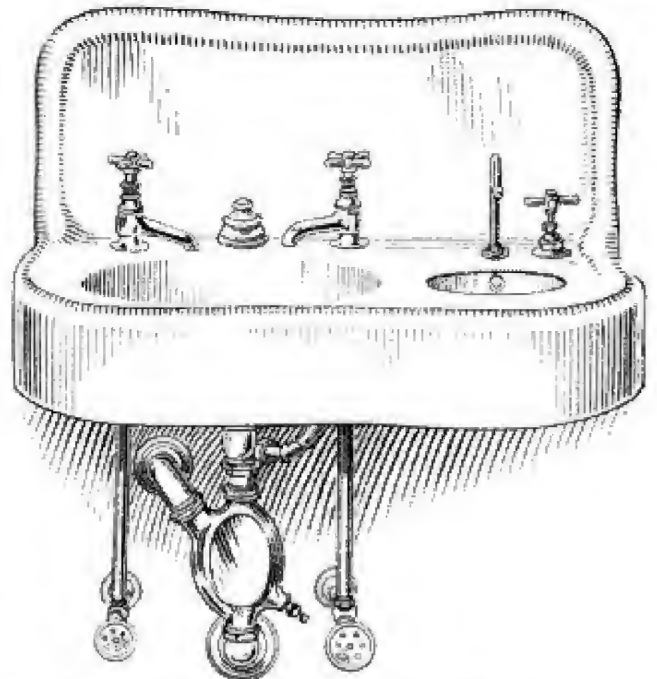
effect is also increased by the fact that the jaws are nearly parallel when the tool is in use.

COMBINATION WASH BOWL AND DENTAL BASIN

The practice of using the wash bowl as a dental basin is obnoxious when considered from a sanitary and hygienic standpoint. Of course it is almost necessary to do so when separate facilities are not provided.

The fixture shown is a combination lavatory and dental basin, with back, slab and apron cast all in one piece and

artistically enameled. It is furnished with special fittings for both bowl and



Obviates Necessity for Using Wash Bowl as Dental Basin

basin and with separate flushing arrangements for each.

SINKING PILES BY MAN-WEIGHT

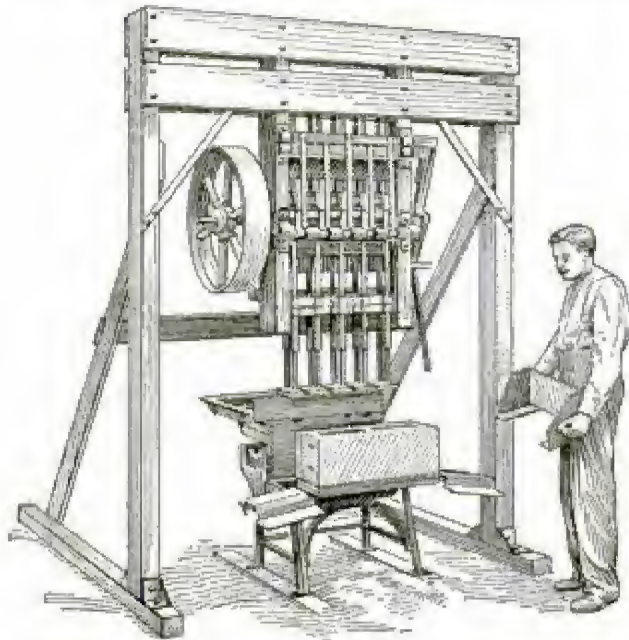
This story of unique utilization of a heavy workman in the sinking of piles comes from the south. The piles were being sunk in soft ground by means of the water-jet method, but some kind of weight was required to make them sink faster. One of the men in the working gang weighed nearly 300 lb., and, because of this weight, along with the fact that this man was not a very hearty worker, he was selected to serve as sinker. A board was nailed to a pile, the heavy man was boosted to this improvised seat, the water jet was applied and the men see-sawed on the ropes, the pile sinking easily.

The process was then repeated with the next pile, all of them being successfully sunk by this method.

¶The United States mints sent out \$141,500,000 in coin during the year 1910, of which \$105,000,000 was gold and \$3,000,000 in pennies and five-cent pieces.

AUTOMATIC POWER TAMPER FOR CONCRETE BLOCKS

The latest model of one of the well-known concrete-block-making machines is provided with an automatic



Tamps Disengaged, and Mold Open for Removal of Finished Block

power tamper, and a scraper and finisher attachment, thus eliminating practically all hand labor from the time the material is placed in the machine until the finished block is removed.

The power tamper is said to deliver a harder and more uniform blow than is possible by hand, and the product is correspondingly better. When the tamping is completed, the operator by pressing a foot lever throws forward a knife which scrapes off the surplus material and deposits a finishing plate directly over the block. The tamps are then thrown again into operation, and, with three or four blows, the block is given a finished back.

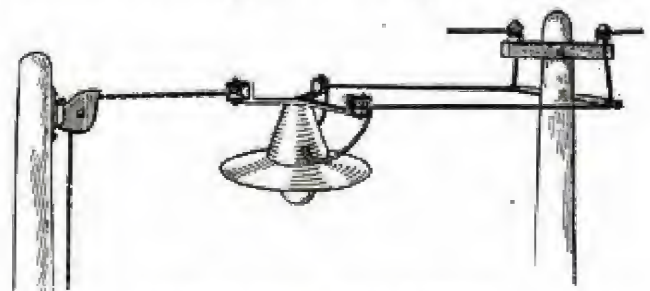
TORONTO HAS NEW TYPE OF CONVERTIBLE CAR

A trolley car that can be used either as an open summer car, or closed completely for winter use, and that contains many new constructional features, has been put in service in Toronto. When used in summer, it is provided

with side openings and benches that run the width of the floor, with a side step its entire length, as is the case with all summer cars. In winter, however, its character is completely changed. Instead of the cross seats it has longitudinal benches, one on either side and its sides are completely closed. The front door between the car and vestibule has been dispensed with, the motorman having a railed-off section of the platform for his use. The car is 44 ft. 9 in. long over all and seats 38 people as a closed car, or 70 when used open. It is of semi-steel construction. The cars are all of the pay-as-you-enter type and so far have been highly satisfactory, both in convenience and comfort, and in economy of operation.

STREET HOOD FOR TUNGSTEN LAMPS

The use of large tungsten lamps for outdoor lighting is comparatively recent, owing to the fragility of this type of incandescent lamp and the difficulty of suspending it so that it would be safe from breakage by the wind. Improvement in the manufacture of these high-efficiency lamps has removed the first objection, and the introduction of special types of street hoods has solved the suspension problem. One of these special suspensions and hoods for a 400-candlepower tungsten lamp is shown in the illustration. The two current-carrying wires form one side of the support, and the third arm of the three-arm rigger is supported by a



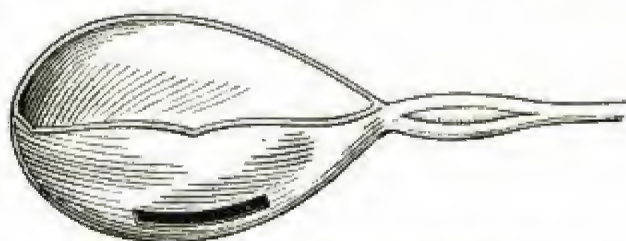
Tungsten Street Hood Suspended

chain or rope which passes over a pole pulley on the opposite side of the street. When the chain or rope is tightened, the street hood is held firmly

in position. It cannot sway or turn over in a windstorm, but remains perfectly level, a matter of the utmost importance when tungsten lamps are used.

SPOON THAT IS PROVIDED WITH A MUFFLER

A spoon that permits the most careless person to eat soup without noise has been invented by a St. Louis man. The inventor claims that a person using this spoon cannot make a noise, even if he feels inclined to do so. The "muffler" which has been applied to the spoon is simply a "lid" that covers one half the surface of the bowl, a slit being provided at the edge through which the liquid enters the mouth of the user. The device is somewhat like the old-fashioned "mustache cups" in the results obtained, and is recommended to men with heavy mustaches for use with all manner of liquids



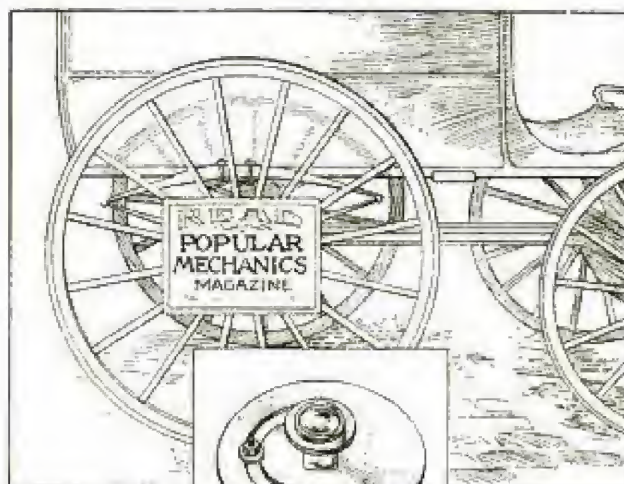
Spoon from Which Soup Can Be Eaten without Noise

taken with a spoon. A spoon with a wider slit or aperture is to be made for use with soups other than the "clear" or "strained" varieties.

AXLE-NUT ADVERTISING

The axle-nut sign is a new idea in advertising especially adapted to spring wagons and all light vehicles used as delivery wagons. The sign plate, made of metal, is held in position by a specially devised nut, which has a ring or plate cast to the free end. This nut is of the shape of the ordinary axle nut, with the exception of the plate, which has a slot one-half of its circumference, in order to allow of the adjustment of the sign plate. The ring on the nut is concaved on the side that

comes in contact with the sign plate, this allowing perfect contact at all points around the ring, which is ex-



Axle Sign and
ing Sign in

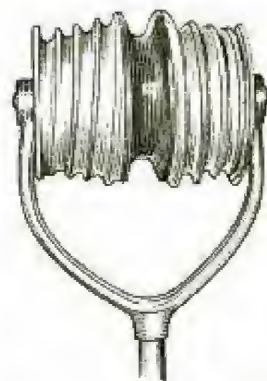
Device for Hold-
Position

pected to keep the sign from rattling when the vehicle is running over rough streets.

The signs are fastened only to the rear spindle, as the driver usually uses the front hub as a step.

TROLLEY REPLACING DEVICE

A new device for the automatic retrieving of a trolley when it leaves the wire, has been invented by an electrical engineer of Brooklyn, N. Y. It consists of two spirals or worms, four threads wide, one placed on each side of the trolley wheel and turning on the same axis.



The threads run inward, so that, when the trolley wheel slips from the wire and the wire engages with the spiral, the forward movement of the car brings the trolley wheel back into place again.

“Consumeter” and “Petrolometer” are two new words proposed to designate a device for measuring gasoline for automobiles, etc.

LARGE HOT-WATER BOTTLES HEAT FRENCH COACHES

Although the limited trains on the branch railways are provided with up-to-date equipment, the local trains,



Hot-Water Bottles That Warm French Local Trains

made up for the most part of the oldest cars, are almost entirely lacking in comfort. Especially is this so as regards heating, the primitive hot-water bottles being still in use.

These bottles are so hot when first placed in the compartments that it is impossible to keep the feet upon them, but they soon grow cold and are worse than useless before a station is reached where an exchange of bottles may be made.

AIR IN GARAGES MENACE TO LIFE

Lack of efficient ventilation in a private garage recently caused the death of a physician in Chicago. The doctor had been in the habit of leaving his automobile engine running while the machine was standing in the garage. Owing to imperfect combustion of the explosive charge in the cylinders, the exhaust gases contained considerable quantities of carbon monoxide gas. This poisonous gas has a peculiar action on the blood, preventing the red corpuscles from properly performing their function of transfer-

ring oxygen from the lungs to the muscular tissues. The effect is not always sudden, and may be due to several successive visits at frequent intervals to an inclosure containing the gas in appreciable quantities.

In this particular instance, the physician was not aware that he was being poisoned until one day he became afflicted with nausea and dizziness when starting up the engine in the garage. These symptoms disappeared when he went out in the open air, but the mischief was done and he died the next day of carbon-monoxide poisoning.

METAL COATING BY A SPRAY APPARATUS

The spraying of perfumery or disinfectants by means of a pneumatic vaporizer has inspired a Swiss inventor to devise a method of applying a metal plating or coating to all kinds of substances, including plaster castings, wooden moldings and stone, as well as metals.

The apparatus is a huge vaporizer. The metal intended for coating purposes is reduced to a molten state in a crucible, which has an opening at the bottom controlled by a valve or tap. Nitrogen or hydrogen, supplied from tanks, is introduced into the apparatus through a tube, which passes over a small furnace heated by illuminating gas, raising the temperature of the gas to 200 deg. F. The tube then divides into two branches, one entering the crucible containing the molten metal, and the other passing under the apparatus to the tap from which the metal is forced by the gas from the first branch. The effect is to convert the molten metal into a cloud of particles and to sprinkle it upon the object to be coated.

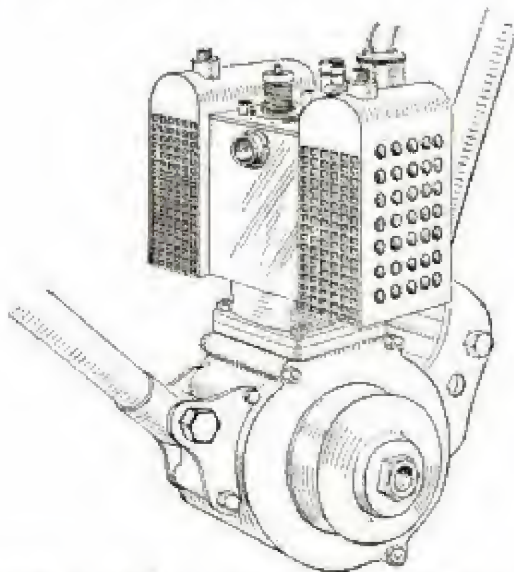
Aviation has reached such importance that one newspaper has begun to print news of it in short paragraphs under a general caption of "SKY VESSEL MOVEMENTS."

VACUUM MACHINE EMPTIES CESSPOOLS

Vacuum cesspool exhausters, some horse-drawn and others motor-driven, are now extensively used in parts of England where such pools are still utilized. The vacuum is created in a cylindrical tank, a suction pipe is connected between the tank and cesspool, and on opening the valve, the sewage is drawn into the tank. The fact that the tank and connection must be airtight if a vacuum is to be created assures an entire absence of the nuisance associated with old methods of cesspool emptying. The capacity of the tanks ranges from 150 to 900 gal.

A UNIQUE RADIATOR FOR MOTORCYCLE ENGINES

A British firm is introducing a motorcycle having a unique type and arrangement of radiator for its water-cooled engine. In this engine the water jackets and side radiators are made of copper and form one piece. The flow of the water from the tank in front, to the rear radiator, around the cylinder to the other radiator, and back again to the tank, is maintained by thermosiphonic action. A water-

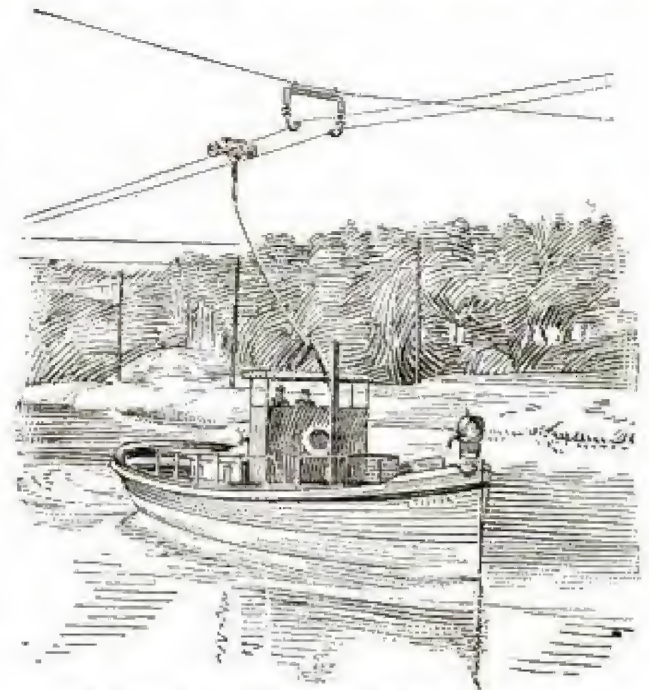


Water-Cooled Motorcycle Engine with Unique Type of Radiator

tight joint between the bottom of the cylinder and the water jacket is made by means of a rubber ring.

TROLLEY TUG-BOAT USED ON GERMAN CANAL

Trolley wires stretched above a waterway in the same manner as they are ordinarily stretched over a city



Ingenious System for Tug-Boat Propulsion

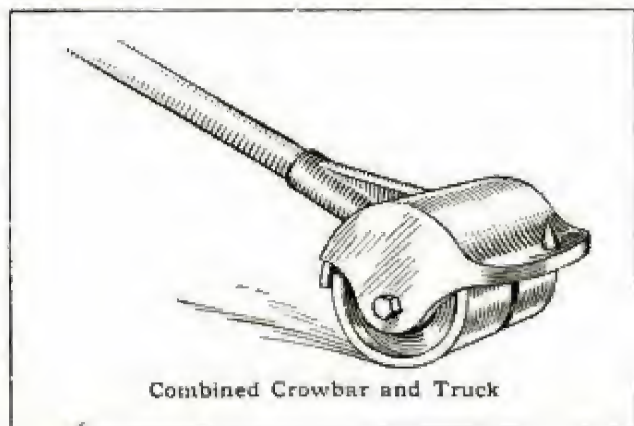
street, and a tug instead of a street car deriving its propulsion power from these wires are the novel sights which greet the visitor to the Teltow Canal in Germany. The electricity is taken from the overhead wires by means of a little wheeled truck, which the tug pulls along as it goes, instead of by a trolley pole.

VEGETABLE GROWTH OF NILE AS FUEL

The dense vegetable growth of the Nile, which is a continual nuisance to river navigators, may become an Egyptian asset, if the tests made of it as fuel in the form of briquets are as satisfactory as claimed. The vegetable growth, known as "sudd," is to be dried, disintegrated and compressed into briquets by machinery. The resulting fuel is claimed to be suitable for use in steam boilers, in which it is expected to give an evaporation of about $4\frac{3}{4}$ lb. of water per pound of briquet.

A COMBINED CROWBAR AND TRUCK

The device shown in the accompanying illustration is used in sets of three for handling heavy pieces, up to three



Combined Crowbar and Truck

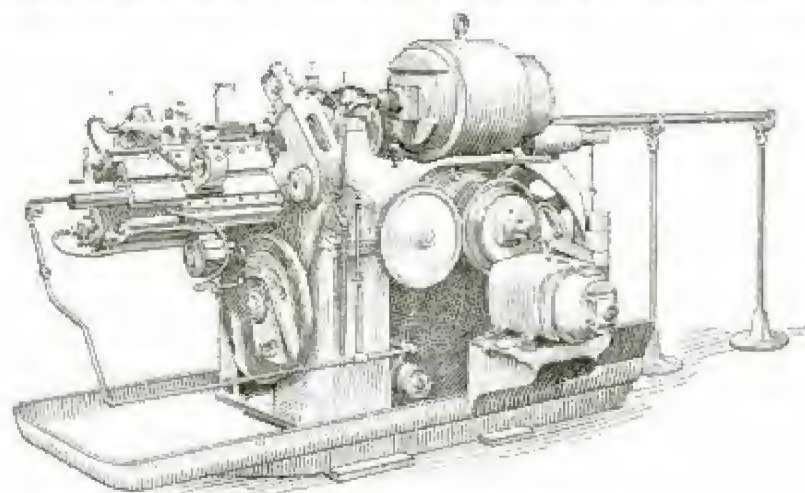
or four tons in weight, on the floors of workshops, factories, etc. The three

truck-crowbars are inserted with their conical points under as many different points of the load, and by bearing down on the handles the load is lifted clear of the floor and can be pushed to any desired place. The conical points prevent slipping. The bar trucks are easily manipulated by ordinary laborers, and are said to be very convenient, even in shops which are equipped with traveling cranes.

A HUMAN STORAGE BATTERY

A miner of Sullivan, Ind., is reported to be so full of electricity that he cannot carry a watch in his pocket for fear of it becoming magnetized and stopping. He has been warned to keep far enough away from the town clock when he wants to know the time.

MOTOR-DRIVEN AUTOMATIC LATHE OF BRITISH DESIGN

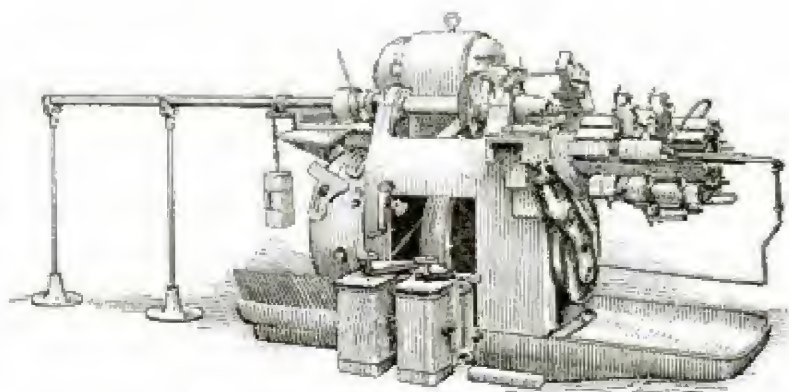


Front View of Motor-Driven Automatic Lathe

The motor-driven automatic lathe built in Manchester, Eng., has one feature at least that differs from the ordinary automatic lathe. In general practice the turret revolves axially on the bed of the lathe, but in this machine its only movement is rotative, which brings the four tool slides, on which the tools are mounted, into position. The turret revolves on

bearings placed in both ends of the headstock, and is actuated by an intermittent revolving worm running in a worm wheel attached to the turret.

The lathe has two motors, one driving the spindle, and the other the feed mechanism. The former is reversible for withdrawing a tap or die. The two motors, having independent controllers, which are automatically



Rear View of the Same Machine

actuated by cams on the operating drum, work independently of each other, and the entire range of spindle speeds can be obtained on any operation.

SECTION OF SHIN BRIDGES GAP IN SKULL

There is only one person in the world, so far as medical science is aware, a section of whose shin might be kicked and his skull fractured in the same place. The medical world is very proud of this person, who has a portion of his shin on the top of his head in the shape of a 3-in. patch over a place where there was no skull. The subject of this remarkable transposition of bone is a four-year-old English boy whose head was successfully operated on at the East London Hospital for Children, early in December, 1910. As the result of a fall when he was 18 months old, the bone over the whole right side of the skull failed to develop, and a large soft tumor, bulging the scalp, formed in its place. The child was brought to the hospital to be treated for another fall and the surgeons found it necessary to remove the tumor, which proved to be a sac filled with the cerebro-spinal fluid usually found in the ventricles of the brain and the spinal cord. The excess fluid was removed and it was then decided to transplant bone from the shin to bridge the space left vacant by the missing parts of the skull. The operation was successful.

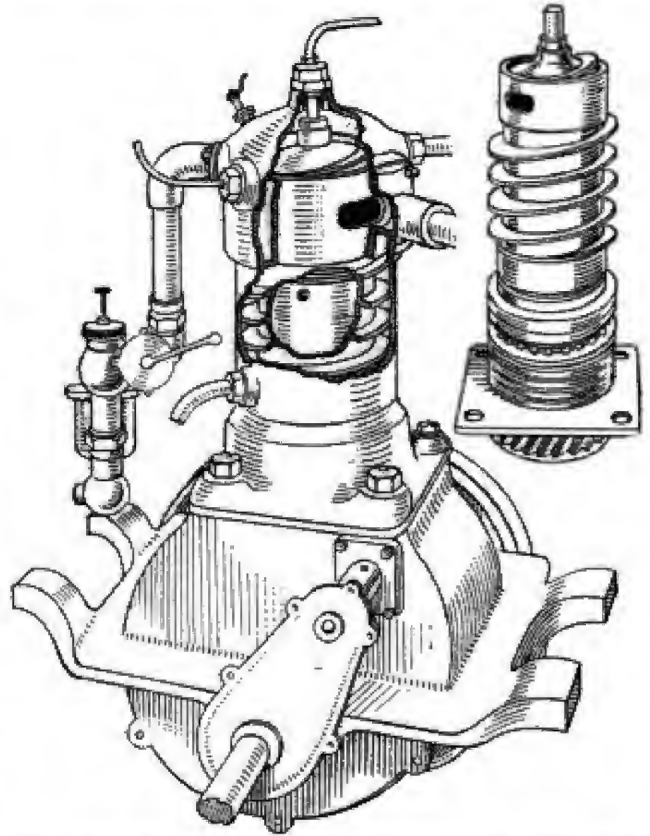
NOVEL TYPE OF INTERNAL COMBUSTION ENGINE

An explosion engine with an axially revolving cylinder that constitutes among other things its own inlet and exhaust valves, reversing gear and water pump, is the remarkable invention of an English engineer.

The two views given herewith show the main features of the engine. The larger drawing in the accompanying illustration is an external view with part of the water-jacket casing and cylinder

broken away to show the interior parts. The smaller drawing shows the revolving cylinder.

The cylinder is rotated at one quarter of the engine speed by worm gear-



Explosion Engine with Revolving Cylinder That Operates Inlet and Exhaust and Circulates the Cooling Water.

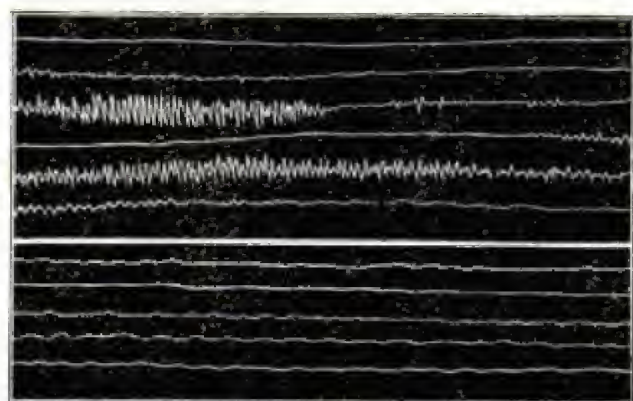
ing. Inside the head of the external casing are four ports, arranged opposite each other in pairs. The ports work with a pair of diametrically opposite ports in the cylinder head, one of which is shown in both illustrations. These ports comprise the valves when working against each other, both for inlet and exhaust.

The revolution of the cylinder, besides causing inlet and exhaust and circulating the cooling water, also automatically laps the piston rings and grinds the "valves," thus keeping the bearing parts perfectly true. Reversing can be accomplished by casting in extra ports and fitting a valve to allow either set of port openings to be used, for forward or backward running respectively.

This engine has been called a "cylinder-valve" engine to distinguish it from other types.

PARIS HAS MUSEUM OF PHONETICS

Paris has a museum of phonetics, established through the efforts of Professor Ponge, where records of spoken words and vocal waves, in the form of diagrams, will be made and preserved to reveal the pronunciation of this



Examples of Diagrams of Words and Vocal Waves Being Preserved in French Museum of Phonetics

century to the people of the centuries to come.

From one century to another pronunciation changes, rhymes cease to rhyme, and vowels and consonants change value. Phonographic records are no doubt becoming more and more perfect in reproducing the human voice, but the ear cannot perceive the infinitesimal fluctuations of sound. The diagrams, however, representing enlarged micro-acoustic waves of only one or two hundredths of a second's duration, will reveal to the eye the difference between records of the same word from different periods, if one diagram be superimposed on another.

The upper part of the illustration shows tracings of words enlarged 576 times in height and 15 times in length, while the lower part shows the curves of the vowels a, e, i, o, and ou in French, enlarged 60 times in height and length.

☞The latest estimate of the yearly coffee consumption per person in the six leading coffee-drinking nations is as follows: Netherlands, 17.06 lb.; Belgium, 13.09 lb.; Sweden, 12 lb.; United States, 10.98 lb.; Germany, 7 lb.

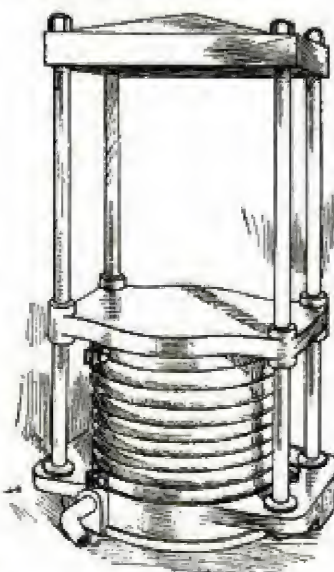
MAY SHOW MOTION FILMS IN RAILWAY STATIONS

The tedium of waiting for trains in the railroad stations of several large cities is to be relieved by the enterprising purveyor of moving pictures. Such, at least, is the proposal of an organization of motion-picture men, who discussed the subject at a recent meeting in Columbus, Ohio, and authorized steps to be taken to secure the co-operation of the railroad authorities.

It was pointed out that there would be a good financial return for the men who would place at the disposal of the people who fill railway-station waiting rooms, some method of spending the time while waiting for trains. It was proposed to give a regular motion-picture show and at the same time to safeguard the travelers with announcements as to the impending arrival or departure of trains. Nothing has yet been heard of the railroad officials' view of the matter.

HYDRAULIC PRESS WITHOUT A PISTON

A new pistonless hydraulic press that uses a collapsible cylinder instead of a ram has been tested in England with highly satisfactory results. The press is the invention of a Russian. There is a steel tension frame provided with a strong head and bed plate and a cylinder carrying a table or platen. The cylinder is made of stout fabric and vulcanized rubber, armored with steel rings and is capable of withstanding a working pressure of 100 lb. per square inch. There are internal and external guides to pre-



vent buckling and the table is guided by side rods. No auxiliary apparatus is required and the town water supply of from 40 to 100 lb. per square inch is used. The whole area of the cylinder being acted upon by the water, pressures of from three to 80 tons are readily obtained. Owing to the elasticity of the walls of the cylinder, the pressure is applied with easy graduation and can be maintained for any length of time without further expenditure of water. There is no leakage, no pump, no cup leather, and no foundations are necessary. A 12-in. cylinder, with 60 lb. water pressure, will give a pressure of three tons, while a 3-ft. cylinder with the same water pressure will give 27 tons. The press has the further advantage of being portable and can be worked with compressed air. It is regarded as a valuable adjunct for electrical workshops where it can be used for numerous purposes, such as making commutators, forcing wheels on shafts, removing street car wheels or tires and molding insulating material.

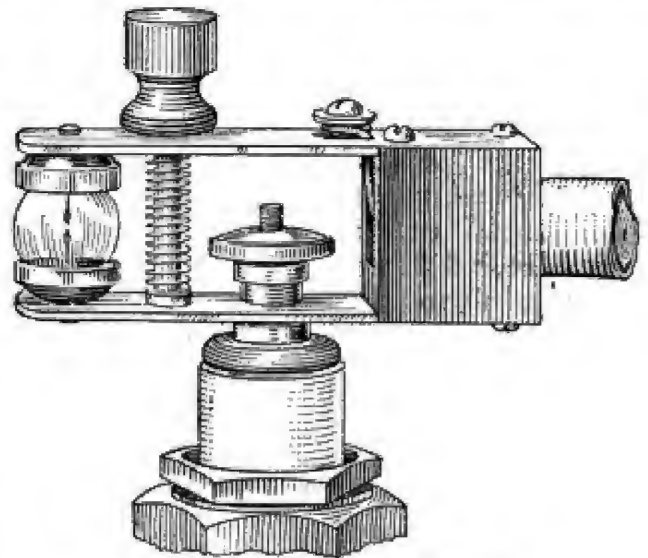
AIRMEN NOT HELD RESPONSIBLE FOR ACCIDENTS

Suits instigated against M. la Gatiellerie and M. Blanck in the French courts, following accidents in which their machines seriously injured persons who were watching the flights, were dismissed on the grounds that aviation is still in its infancy, and that airmen have to contend with forces unknown and uncontrollable.

The court held that it was in no way able to establish when an airman should be considered incompetent, and that lack of proper precautions could not be proven, because the court was not sufficiently informed to say decisively what precautions should be taken. The decision in one of the cases ended with the statement that the public certainly should be protected against such accidents, but that in the absence of laws and regulations responsibility could not be fixed.

SPARK-PLUG TESTER

A handy tester for spark plugs was exhibited at the recent motorboat show in London. It is called a spark lamp, and consists of a small glass bulb held by a terminal fitting, which can be



Spark Lamp Tests Spark Plugs

fitted to any plug having a screw terminal. The bulb contains two electrodes, which are connected direct to the magneto distributor by turning a thumbscrew, causing the bulb to light up. The bulb also contains a vapor, which produces a luminous discharge and offers very little resistance to the high-tension current.

OLD ENGINE STILL WORKS WITH POWER TRIPLED

Built in 1854 to work on a steam pressure of 30 lb., an engine of the walking-beam type is still in service in an English ironworks, and, what is still more remarkable, is doing much heavier work than it did 56 years ago. In 1898 it was converted into a compound engine by the addition of a second cylinder, and the pressure increased to 120 lb. In 1910 it was converted into a triple-expansion engine by adding yet another cylinder, and is now working with steam at 200-lb. pressure. In this manner the ancient engine has been keyed up to meet the increasing demands of the plant instead of finding a place in a museum.

TELEPHONE STATION FAR ABOVE THE CLOUDS

Although stringing telephone wires under the sea or along the lower levels of the surface of the earth has been regarded as presenting many difficulties to linemen, there is at least one place in the world where greater trouble was experienced running the wires high above the earth. This was at the loftiest telephone station in the world—at the highest meteorological station, on the summit of Mont Rosa in the Italian Alps, 14,960 ft. above the sea level. The mountain top is covered with perpetual snow and the installation of the telephone system that connects it with two other stations on lower peaks and with the world at large was regarded as a wonderful feat. Poles could not be used

on the extreme heights, and the wire was laid along the ground, on top of the snow, which is so dry that it is almost a nonconductor. In fact, the line would not operate properly until the director of the observatory had himself lowered with ropes into the deep crevice of a glacier, the only place he could obtain a good ground for the wire.

The meteorological observatory is a wooden building built with double walls 4 in. apart and covered with an outside shell of copper. Sound sleep is impossible at Mont Rosa, owing to the low barometric pressure and the constant vibration of the copper shell of the building by the winds which are always blowing. The observatory is named in honor of Queen Marguerite, the widow of the late King Humbert of Italy.

MISSION TELEPHONE STAND AND STOOL

The stand shown in the accompanying illustration is for use with a desk telephone. The stool, when not in use, slides on two runners under the stand.



Telephone Stand and Stool Complete

A shelf is provided for the telephone directory, paper, pencil, etc.

The joints may be made with dowels, or the mortise and tenon may be used, as desired. If the latter is decided upon, allowance must be made on the length of the rails for the tenons. The list given is for the dowel-made joints. The following stock list gives the amount of material needed which should be ordered planed and sanded. This work can be done by hand if the builder has the time and desires to have an entire home-made article. However, the list is given for the mill-planed material.

STAND

- 4 posts, $1\frac{1}{2}$ in. square by 29 in.
- 2 rails, $\frac{3}{8}$ by 5 by 11 in.
- 1 rail, $\frac{3}{8}$ by $1\frac{1}{2}$ by 13 in.
- 1 rail, $\frac{3}{8}$ by 5 by 13 in.
- 2 runners, $\frac{3}{8}$ by $1\frac{1}{2}$ by 14 in.
- 1 top, $\frac{3}{8}$ by 18 by 20 in.
- 1 shelf, $\frac{3}{8}$ by $12\frac{1}{2}$ by $13\frac{3}{4}$ in.

STOOL

- 4 posts, $1\frac{1}{2}$ in. square by 17 in.
- 4 rails, $\frac{3}{8}$ by 4 by $6\frac{1}{2}$ in.
- 4 rails, $\frac{3}{8}$ by 2 by $6\frac{1}{2}$ in.
- 1 stretcher, $\frac{3}{8}$ by 4 by $7\frac{1}{4}$ in.
- 1 top, $\frac{3}{8}$ by $12\frac{1}{2}$ in. square.

The exact lengths for the posts are given in the list. Should the builder

desire to square them up, allowance must be made for this when ordering the stock.

Arrange all the pieces in the position they are to occupy in the finished stand and stool and number all the joints. Locate the centers and bore holes for all the dowels. Assemble the two sides of the table first. Notch the runners and fasten them to the posts with flathead screws. Use hot glue on the dowel joints if possible.

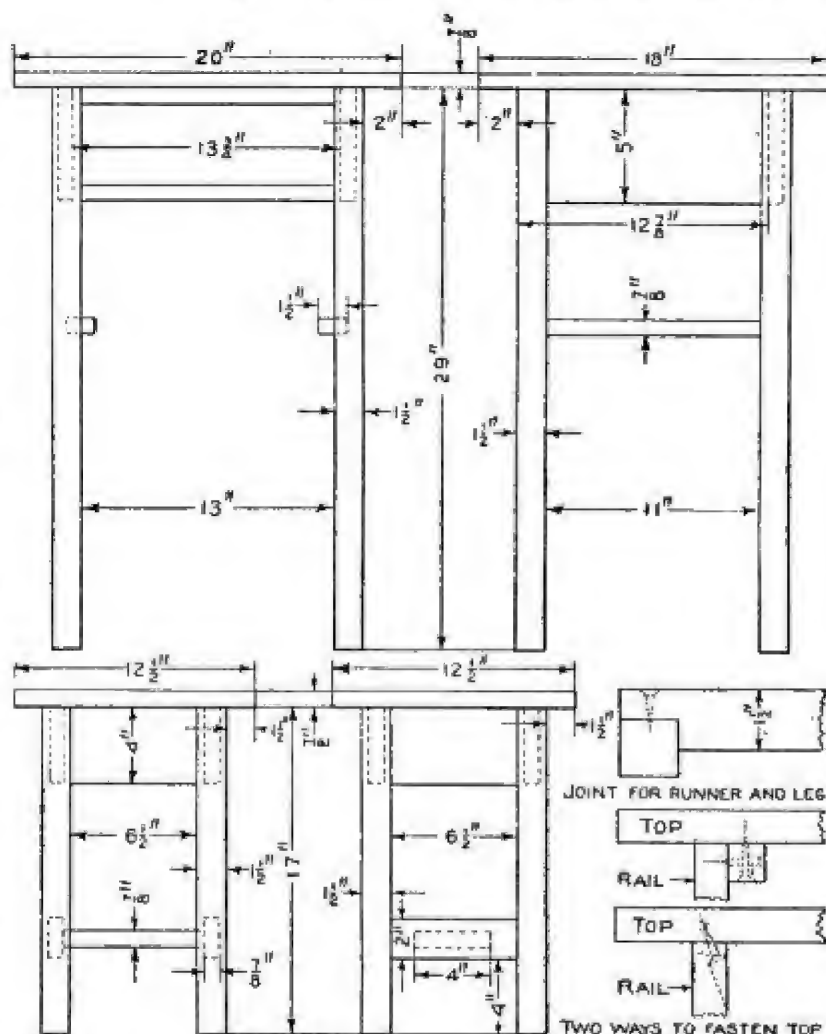
Cut the corners out of the shelf to fit the legs and assemble the frame of the table. Use round head screws through the rails to hold the shelf. The top may be fastened in two ways, with screws through cleats on the inside of the rails and under the top, or with screws slanting through the upper part of the rails and into the top as shown. The stool is assembled in the same manner as the stand.

The stand and stool should be finished to harmonize with the furniture and woodwork of the room in which they are to be used. Stains, fillers, wax and varnish can be purchased with directions for use.

ICE GIVEN A CERTIFICATE OF CHARACTER

Certified ice is the next commodity to succumb to the pure-food dictum and acquire a certificate of character from the hygiene experts. It is destined to make its bow to the public as soon as the necessary emblems of purity can be distributed. The Natural Ice Association of America has decided that its members must supply their customers with certified natural ice just as certified milk is sup-

plied to the consumers. While the members of the Association are unanimous in their belief that ice has never



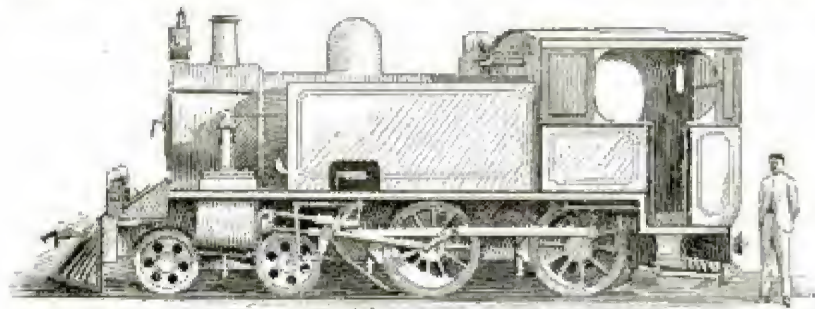
Telephone Stand and Stool Details

been a vehicle of disease, and their opinion is indorsed by eminent sanitarians, nevertheless they believe that the public generally does not know this fact, and by the adoption of a high standard of purity and the certification of the commodity under hygienic rules, they will forestall any criticism and allay any suspicion that may arise. The trademark or emblem will bear the name of the chemist who certifies the product.

German investigations covering a period of over 20 years show that telegraph poles have the greatest life when treated with tar oil as a preservative. The cost of such treatment is also less than that of other known processes.

NEW TANK LOCOMOTIVES FOR INDIA

The Madras and Southern Mahratta Railway, India, has just added several improved tank locomotives to its equipment. They are especially designed for working fast branch-line trains at an average speed of 35 miles an hour. A special feature of the boiler is the arrangement of longitudinal stays, which are stopped at each side of the dome opening and carried

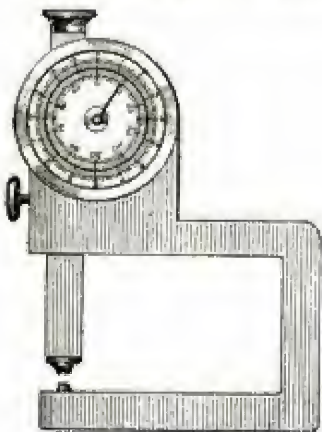


Oil-Burning Locomotive for Indian Railway

by cross beams. This provides sufficient space to admit a workman into the boiler when retubing is required. The smoke-box is exceptionally large and is fitted with baffle plates and a spark arrester.

TIME-SAVING MICROMETER CALIPER

A boon to the machinist or bench hand who would save time in calipering



his more accurate work is the automatic micrometer caliper recently introduced by an English manufacturer. American manufacturers have long been justly famous for the fine workman-

ship of their accurate measuring instruments, but all of these devices which were evolved from the historic Whitworth measuring machine are somewhat difficult to read, especially in a poor light. In the device illus-

trated herewith, the vernier scale of the usual form of micrometer caliper is replaced by a dial on which is indicated the measurement, which can be read off at a glance in decimal fractions of an inch or of a millimeter or in vulgar fractions of an inch.

THE SPERM WHALE'S OIL TANK

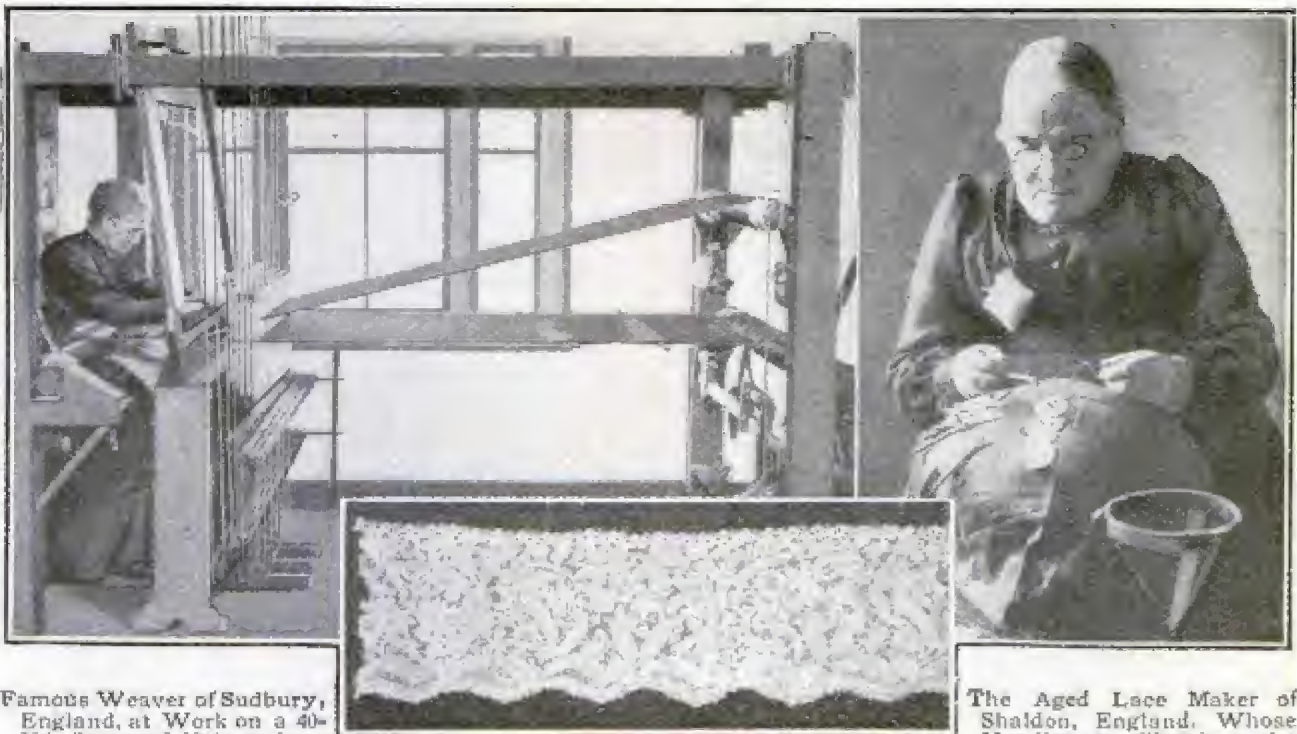
The oil tank in the head of sperm whales is believed by Prof. R. C. Andrews of the American Museum of Natural History to be a provision of nature by means of which it keeps from starvation when food is scarce. He says that his experiments seem to show that the oil from this tank is absorbed by the whale's body at times when food is scarce. It is said that as many as 20 bbl. of oil have

been found in the head tank of fat sperm whales, while the tanks in all thin whales captured have been found nearly empty.

Prof. Andrews has just returned from a 38,000-mile hunt in the Pacific for whale specimens. He brought back the skeletons of an 80-ft sulphur-bottom whale, a 70-ft. finback, a 46-ft. Sei, and two killer whales, one 22 ft, and the other 26 ft. long. He also collected hundreds of specimens of birds and animals, visiting many of the islands in the Pacific.

BURGLAR DISGUISED AS STATUE

Policemen, detectives and private watchmen searched the Fidelity Loan Building in Pittsburg for two hours after burglar alarms had served notice that thieves were at work, then one of the policemen idly tapped a sheeted statue in a studio on the second floor, and the hunt ended. The supposed statue suddenly came to life and started for the door, but the policeman felled it by throwing his club. The burglar had stood on the pedestal for nearly two hours.



Famous Weaver of Sudbury, England, at Work on a 40-Yd. Piece of Velvet for a Coronation Robe

The Aged Lace Maker of Shaldon, England, Whose Handiwork will Adorn the Queen's Robe

MAKING LACE AND VELVET FOR THE CORONATION

Hundreds of yards of velvet and lace will be used in the robes of the peers and peeresses of England who participate in the ceremony of crowning King George and Queen Mary at Westminster next June, much of which must be especially made for the purpose. Every one of the lords and ladies in attendance will wear a velvet robe. The making of so many robes requires a large excess over the normal output of the looms and mills turning out this material. Preparations have already commenced in England to supply the demand. Some of the finest velvet that will be used comes

from looms at Sudbury in Suffolk. Here much of the work is done by old-fashioned hand methods and each piece is a perfect production of the weaver's art. Miss Foakes, of Sudbury, is famous for the excellence of the quality of velvet made by her. She has already commenced her work on coronation orders, one of which involves the weaving of a piece of velvet 40 yd. long which will require three months' labor.

Some of the lace which will be worn by Queen Mary is being made by an aged woman at Shaldon who has made lace more than half a century.

ADJUSTABLE AUTOMOBILE STEERING COLUMN

A steering column that will meet the height requirements of a person of any stature is a new automobile feature. The inclination of this column and the height of the steering wheel may be altered in a few minutes. The column passes freely through a swiveling

socket which is pivoted to a horse-shoe-shaped casting in the dashboard aperture. By unscrewing the locking nut which secures the gear box at the bottom of the column in place, the inclination of the column can be changed at will, and the new setting is made fast by securing the locking nut, the column automatically sliding through the socket to take up its new position.



AUSTRIAN LIMBLESS PAINTER

This Austrian artist lost both arms and legs in a railroad accident but still makes a living by painting. He guides the brush with his chin, the brush handle being supported on the stump of his right arm. The paintings are necessarily simple.



RUSSIAN COUNTERFEITERS

The above photograph was taken when a band of Russian counterfeiters was arrested recently in Moscow. The metal from which the counterfeit money is stamped out is shown. Russian police photographs such as this are almost impossible to procure.



Japanese Woman Dentist in Her London Operating Room

JAPANESE WOMAN DENTIST

Europe has long considered the American dentist to be far superior to its own product, and the most successful dentists in both England and on the Continent have been Americans. The latest "foreign" dentist to set up a practice in London, however, is not an American, but a Japanese, and a Japanese woman at that.

Excavations near Liege, Belgium, unearthed a Roman villa, in the basement of which was found a quantity of coal in large pieces. This leads to the belief that the coal deposits of Belgium were exploited as far back as the beginning of the Christian era.

American brook trout and rainbow trout are being propagated at the ancient castle of Langen, Westphalia, Germany, the most of which has been transformed into a fish hatchery.

TO DETERMINE EFFECT OF LIGHTNING PHENOMENA

The authorities of the University of Illinois are preparing to continue next summer their experiments as to the best means of protection against lightning, using a more extensive apparatus. The experiments are to be carried out in an open field, in which twelve 40-ft. poles have been erected. Six of these are equipped with devices for registering the effect of lightning strokes at or near the poles. There is a series of spark gaps with induction, resistance and capacity fixtures, so that the lightning may jump across the gaps or pass around through shunt circuits. Any action due to lightning will be recorded on a moving strip of paper driven by clockwork so that the exact time of the electrical discharge can be told from the record. Three of the poles have been equipped with sharp needle points and three with brass balls.

A LARGE BALL BEARING

The construction of an enormous center ball bearing for a railway swing bridge at Yarmouth, England, may be seen in the accompanying illustration.

About 400 turns every month are made by this bridge, and after several years' service the V grooves of the original bearing were found to be so worn that the bearing had to be replaced. The original bearing consisted of two rings having V grooves in which there were 69 balls, 2 in. in diameter, said to have been the largest made at the time the bridge was installed.

In the new center ball bearing, the number of balls was reduced to 22 and their diameter increased to $3\frac{1}{2}$ in. The balls run in segmental grooves having a radius of $2\frac{1}{4}$ in. A cage for

separating the balls was omitted in order not to reduce the number of balls below the safety limit. It is held that the absence of the cage is not of great importance as the speed of the balls running in the grooves is extremely low.

The bearing sustains a weight of

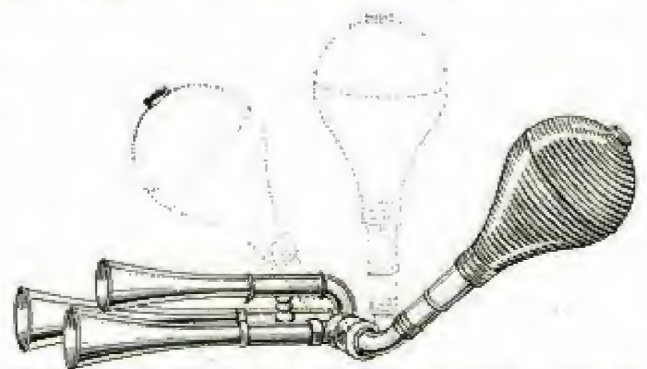


Ball Bearing That Sustains Nearly 1,000,000 Lb. Compare Steel Balls with Baseball Below

nearly 1,000,000 lb. and is one of the largest of its class in the world

PUSH OVER THE BULB AND CHANGE THE TONE

One of the latest things in motor horns is a novelty in which any of three tones may be obtained by pushing over the bulb, as shown in the accompanying diagram. The inventor's idea evi-



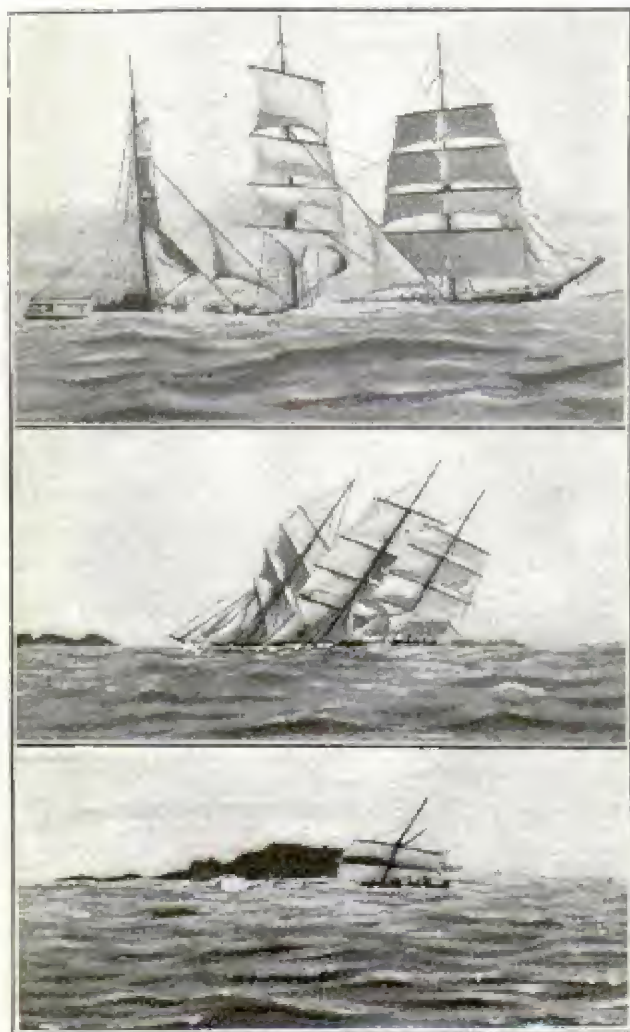
Dotted Lines Show Two Other Positions Producing Different Tone

dently was that a sudden change in tone might be the means of moving a daydreamer when a monotonous toot is ineffective.

A mad buffalo that was terrorizing the community in Anoka county, Minnesota, was hunted down by marksmen in an automobile.

SHIP PHOTOGRAPHED WHILE SINKING

These illustrations are reproductions of the remarkable photographs taken of the three-masted sailing ship "Arden



The "Arden Craig" Sinking
Heeling Over for the Final Plunge
A Moment or Two after She Went Down

Craig" as she was foundering off the Scilly Isles, which are situated 25 miles southwest of Land's End, the extreme southwesterly point of England. The first photograph was taken just after the deck became awash, the second as she heeled over for the final plunge, and the third a moment or two after she went down. Several hundred people watched the sinking from the shore.

—
An electric scarecrow, invented by an Austrian engineer, consists of a clock connected to an electric battery so as to ring a series of bells at frequent intervals to keep the birds unsettled and alarmed.

WIRELESS OPERATOR PICKS UP PHONE MESSAGES

A wireless-telegraph operator at Tatoosh, the extreme northeast point of the state of Washington, recently picked up a wireless-telephone conversation from San Francisco, more than 800 miles away, and audible signals were heard at intervals through the earpiece of the wireless-telegraph instrument for 2½ hours.

Considering the distance, and the ease with which the messages were determined, this is considered to be a remarkable feat in wireless communication, although it is a well-known fact that a similar phenomenon led Dr. Lee de Forest to develop his system of wireless telephony.

AEROPLANE NEWSBOY LATE WITH HIS PAPERS

An attempt was made at the Los Angeles aviation meet to test the value of the aeroplane to deliver newspapers to distant points, but little success was attained. Airman D. Masson left Los Angeles in the afternoon, driving a Curtiss biplane, with packets of newspapers to deliver at Pomona and San Bernardino. He missed Pomona and was lost in the hills north of the town. His fuel finally became exhausted and he alighted 12 miles west of San Bernardino, which town he finally reached 5 hr. and 40 min. after leaving Los Angeles.

SLEDBARROWS FOR COLD WEATHER

A Wisconsin inventor has designed a runner attachment which can be fitted to the axle of a wheelbarrow in place of the wheel, when the ground is covered with snow or ice. The runner is similar to the ordinary bobsled type, and has an A-shaped brace rising from it with a hole at the top through which the axle runs. The back of the barrow can be raised and lowered in exactly the same manner as when a wheel is used.

VACUUM CLEANER USED TO REMOVE WATER

A new use for the vacuum cleaner was found in New York recently when this simple device was utilized to save damage from water after a fire in a large office building. The greatest damage resulting from fires is usually from the water used to extinguish the flames. In many instances floors are soaked and the water accumulates in large quantities. In this case, the superintendent of the building set his force of janitors to work with vacuum cleaners immediately after the firemen had left the building, and within a comparatively short time practically every drop of the water had been removed from the floors, thus eliminating all possibility of damage from this source.

DEEPEST HOLE IN WORLD IS IN SILESIA

Scientific study of the temperature of the earth's crust is materially assisted by a well that has been sunk at the little village of Czuchow, in Silesia, Germany, to a depth of almost a mile and a half below the surface. This is believed to be the deepest hole in the world. The bore is $17\frac{1}{3}$ in. in diameter at the mouth and a little short of two inches at the bottom. The exact depth of the hole is said to be 7,348 ft. For a distance of 6,848 ft. it is lined with iron tubing. The experiments that have so far been made with the bore show that the temperature of the earth increases at the rate of 1 deg. Fahrenheit with each section of 58 ft., or 1 deg. Centigrade for each 104.3 ft.

CONCRETE OBSERVATION AND WATER TOWER

A novel combined water tank and observation tower, constructed of concrete, was recently erected at Singen, Germany. The tank has a capacity of

66,000 gal., and its bottom has an elevation of 98 ft. above ground.

In addition to the tank deck there are three intermediate decks, which, with the balustrade and stairs, form the wind bracing. The spiral stair-



Combined Observation and Water Tower of Concrete way is carried on the main columns by bracket reinforcement.

The tank itself, which is constructed of steel, has several interesting features. It is so mounted that the leaks which may develop can be stopped from the outside while the reservoir is filled. This requirement made necessary the use of a removable construction in protecting the tank from freezing. Reinforced concrete posts were erected at intervals around the tank to form supports for removable concrete panels, and the space between the panels and the tank was filled with heat-insulating material.

GRAVITY SPIRAL CARRIER

This spiral carrier is a unique device for handling merchandise by the force of gravity. The boxes and barrels slide along on ball-bearing rollers. A switch is provided which will divert the merchandise from the spiral to any floor desired.

CHANDELIERS OF CRUTCHES, CANES AND PIPES

Probably the oddest electric chandeliers in the country and perhaps in the whole world, are to be found in an institution in Los Angeles, California, which claims to have cured many sufferers by prayer.

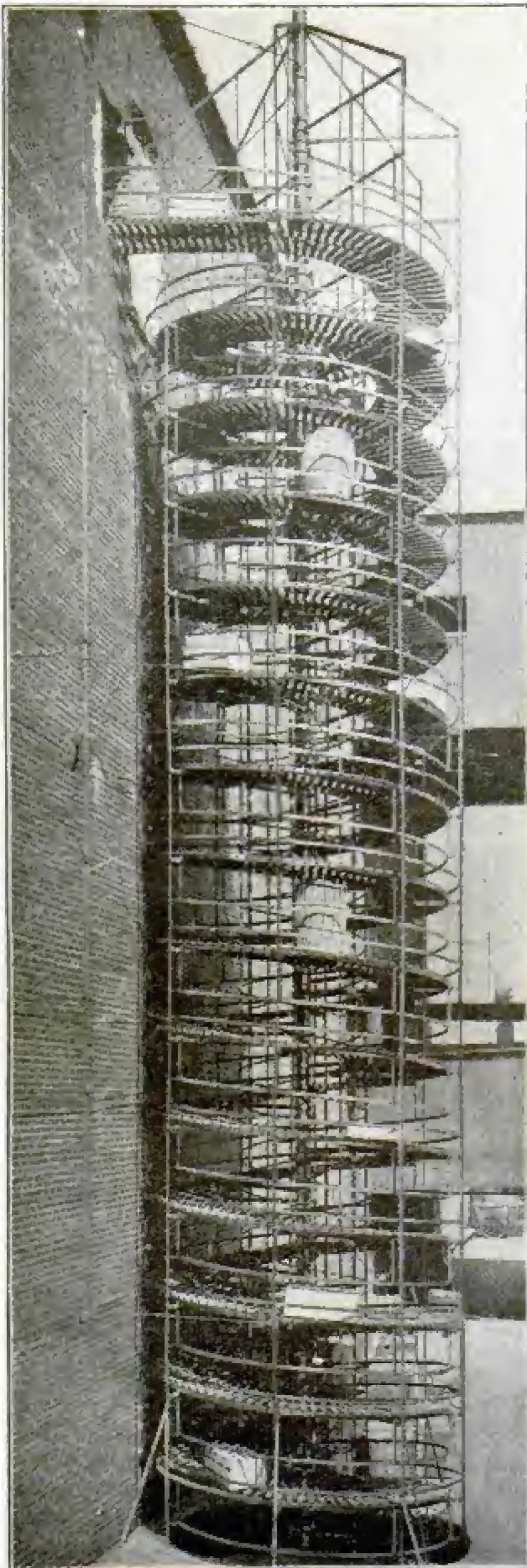
As proofs that the claims were justified, the evangelist in charge of this faith-healing institution has used the discarded crutches and walking sticks as wall decorations and chandeliers for the tabernacle. The lighting device is composed of a frame of crutches wired together in a symmetrical form, and electric bulbs are suspended from them and from the end of the canes.

The final artistic touch is given to these chandeliers by a collection of pipes hanging from the wires. It is part of the teaching of this sect to abandon the use of alcohol and tobacco and each pipe represents a converted devotee of the weed.

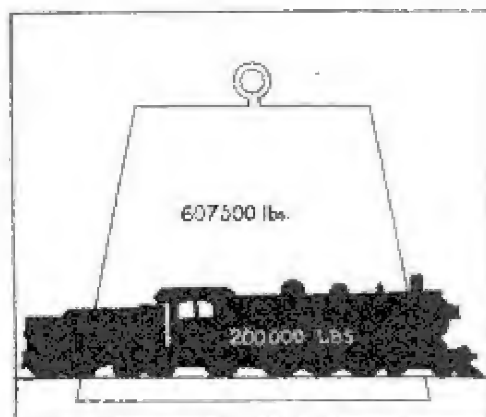
HIGHEST RAILROAD IN WORLD

The highest point reached by any railroad in the world is claimed to be on the Morococha branch of the Central Railway of Peru, a broad-gauge line operated by the Peruvian Corporation. It reaches a height of exactly 15,865 ft. above sea level, poised upon the backbone of the continent.

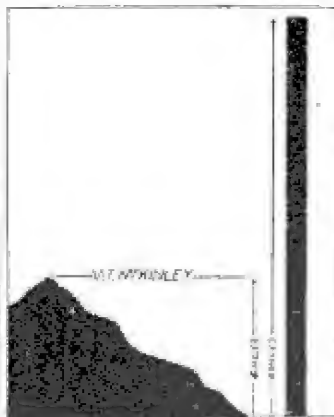
The highest railroad station in the world is at Ticlio, the western portal of the Galera tunnel, at a height of 15,665 ft. above sea level. This is the junction of the Morococha branch with the main line.



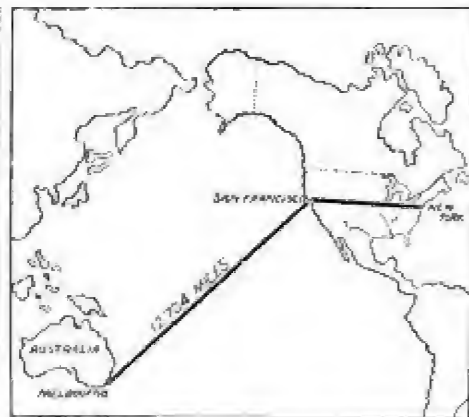
Utilizing Gravity to Lower Merchandise



The Total Weight of All Census Cards is More Than Three Times That of a Locomotive



If Stacked One Upon Another They Would Make a Pile 14 Miles High



If Placed End to End the Cards Would Encircle More Than Half the Earth

TWELVE THOUSAND MILES OF CENSUS CARDS

PICTURE in your mind a single row of cards more than 12,000 miles in length, if placed end to end after the fashion of a train of cars, and you will have a fairly accurate conception of the number of pieces of cardboard that are needed to compile the census of the United States.

This odd bit of information was brought to light at the census office in Washington recently when an estimate was made of the amount of shelving necessary to hold this great number of cards while the finishing touches are being added to Uncle Sam's decennial nose-counting bee. The cards used in this enormous undertaking are printed at the Government printing office on a specially prepared grade of manila paper, composed largely of hemp in order to insure toughness. The cards measure $3\frac{1}{4}$ by $6\frac{5}{8}$ in.

The first step in their preparation is to run them through an electrically-operated punching machine, having a keyboard resembling that of a typewriter. This machine punches them in accordance with the data found on the sheets used by the enumerators in their house-to-house canvas and at the same time registers the number of cards handled.

The manner in which these data are transferred from the enumerating sheets to the cards can be better understood from the accompanying illustration showing one of the census cards after the punching process.

After this punching process has been completed, the cards are run through a verifying machine that rejects any that have been punched improperly. The cards are then assorted into groups by another type of machine and then forwarded to the electrical tabulating machines which record the final counting.

According to the present plans of the census office, there will be two sets of cards to be counted. There will be a card for each one of the 93,402,151 persons who represent the total population of the country and to this number will be added something more than 28,000,000 cards on which family statistics will be recorded. In all, there will be about 121,500,000 cards to be handled.

The paper on which the cards are printed is $7\frac{1}{2}/1000$ of an inch in thickness. In other words if the cards are stacked one upon another after the fashion of a deck of playing cards there will be $133\frac{1}{3}$ to the inch. If the entire number could be stacked up in this fashion, they would make a single pile over 14 miles high. This would be equivalent to more than three times the height of Mt. McKinley in Alaska which is nearly four miles high.

If it were possible to place the cards end to end they would make a row 12,704 miles in length or in other words more than half way around the world. This would permit a row of cards from New York City to Melbourne,

Australia, via San Francisco, and there would still remain over 500 unused miles of cards.

As there are 200 cards to the pound, the total weight of the 121,500,000 cards is about 607,500 lb. An idea of such an enormous weight can be better understood when it is compared with the average railroad locomotive which weighs about 200,000 lb.

If the total number of cards were

AERO RUNS AWAY WITH THE GOVERNOR OF TEXAS

The first aeroplane runaway on record occurred at Dallas, Tex., Jan. 9, and Gov. O. B. Colquitt of Texas was a victim of the machine. The governor was seated in an aeroplane with Airman John J. Frisbie having his picture taken by a moving-picture machine. To make the picture more realistic the

B-1010

2978

11-403

1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	41	42	43	44	45	46	47	48	49	50	51	52	53	54	55	56	57	58	59	60	61	62	63	64	65	66	67	68	69	70	71	72	73	74	75	76	77	78	79	80	81	82	83	84	85	86	87	88	89	90	91	92	93	94	95	96	97	98	99	100	101	102	103	104	105	106	107	108	109	110	111	112	113	114	115	116	117	118	119	120	121	122	123	124	125	126	127	128	129	130	131	132	133	134	135	136	137	138	139	140	141	142	143	144	145	146	147	148	149	150	151	152	153	154	155	156	157	158	159	160	161	162	163	164	165	166	167	168	169	170	171	172	173	174	175	176	177	178	179	180	181	182	183	184	185	186	187	188	189	190	191	192	193	194	195	196	197	198	199	200	201	202	203	204	205	206	207	208	209	210	211	212	213	214	215	216	217	218	219	220	221	222	223	224	225	226	227	228	229	230	231	232	233	234	235	236	237	238	239	240	241	242	243	244	245	246	247	248	249	250	251	252	253	254	255	256	257	258	259	260	261	262	263	264	265	266	267	268	269	270	271	272	273	274	275	276	277	278	279	280	281	282	283	284	285	286	287	288	289	290	291	292	293	294	295	296	297	298	299	300	301	302	303	304	305	306	307	308	309	310	311	312	313	314	315	316	317	318	319	320	321	322	323	324	325	326	327	328	329	330	331	332	333	334	335	336	337	338	339	340	341	342	343	344	345	346	347	348	349	350	351	352	353	354	355	356	357	358	359	360	361	362	363	364	365	366	367	368	369	370	371	372	373	374	375	376	377	378	379	380	381	382	383	384	385	386	387	388	389	390	391	392	393	394	395	396	397	398	399	400	401	402	403	404	405	406	407	408	409	410	411	412	413	414	415	416	417	418	419	420	421	422	423	424	425	426	427	428	429	430	431	432	433	434	435	436	437	438	439	440	441	442	443	444	445	446	447	448	449	450	451	452	453	454	455	456	457	458	459	460	461	462	463	464	465	466	467	468	469	470	471	472	473	474	475	476	477	478	479	480	481	482	483	484	485	486	487	488	489	490	491	492	493	494	495	496	497	498	499	500	501	502	503	504	505	506	507	508	509	510	511	512	513	514	515	516	517	518	519	520	521	522	523	524	525	526	527	528	529	530	531	532	533	534	535	536	537	538	539	540	541	542	543	544	545	546	547	548	549	550	551	552	553	554	555	556	557	558	559	560	561	562	563	564	565	566	567	568	569	570	571	572	573	574	575	576	577	578	579	580	581	582	583	584	585	586	587	588	589	590	591	592	593	594	595	596	597	598	599	600	601	602	603	604	605	606	607	608	609	610	611	612	613	614	615	616	617	618	619	620	621	622	623	624	625	626	627	628	629	630	631	632	633	634	635	636	637	638	639	640	641	642	643	644	645	646	647	648	649	650	651	652	653	654	655	656	657	658	659	660	661	662	663	664	665	666	667	668	669	670	671	672	673	674	675	676	677	678	679	680	681	682	683	684	685	686	687	688	689	690	691	692	693	694	695	696	697	698	699	700	701	702	703	704	705	706	707	708	709	710	711	712	713	714	715	716	717	718	719	720	721	722	723	724	725	726	727	728	729	730	731	732	733	734	735	736	737	738	739	740	741	742	743	744	745	746	747	748	749	750	751	752	753	754	755	756	757	758	759	760	761	762	763	764	765	766	767	768	769	770	771	772	773	774	775	776	777	778	779	780	781	782	783	784	785	786	787	788	789	790	791	792	793	794	795	796	797	798	799	800	801	802	803	804	805	806	807	808	809	810	811	812	813	814	815	816	817	818	819	820	821	822	823	824	825	826	827	828	829	830	831	832	833	834	835	836	837	838	839	840	841	842	843	844	845	846	847	848	849	850	851	852	853	854	855	856	857	858	859	860	861	862	863	864	865	866	867	868	869	870	871	872	873	874	875	876	877	878	879	880	881	882	883	884	885	886	887	888	889	890	891	892	893	894	895	896	897	898	899	900	901	902	903	904	905	906	907	908	909	910	911	912	913	914	915	916	917	918	919	920	921	922	923	924	925	926	927	928	929	930	931	932	933	934	935	936	937	938	939	940	941	942	943	944	945	946	947	948	949	950	951	952	953	954	955	956	957	958	959	960	961	962	963	964	965	966	967	968	969	970	971	972	973	974	975	976	977	978	979	980	981	982	983	984	985	986	987	988	989	990	991	992	993	994	995	996	997	998	999	1000	1001	1002	1003	1004	1005	1006	1007	1008	1009	1010	1011	1012	1013	1014	1015	1016	1017	1018	1019	1020	1021	1022	1023	1024	1025	1026	1027	1028	1029	1030	1031	1032	1033	1034	1035	1036	1037	1038	1039	1040	1041	1042	1043	1044	1045	1046	1047	1048	1049	1050	1051	1052	1053	1054	1055	1056	1057	1058	1059	1060	1061	1062	1063	1064	1065	1066	1067	1068	1069	1070	1071	1072	1073	1074	1075	1076	1077	1078	1079	1080	1081	1082	1083	1084	1085	1086	1087	1088	1089	1090	1091	1092	1093	1094	1095	1096	1097	1098	1099	1100	1101	1102	1103	1104	1105	1106	1107	1108	1109	1110	1111	1112	1113	1114	1115	1116	1117	1118	1119	1120	1121	1122	1123	1124	1125	1126	1127	1128	1129	1130	1131	1132	1133	1134	1135	1136	1137	1138	1139	1140	1141	1142	1143	1144	1145	1146	1147	1148	1149	1150	1151	1152	1153	1154	1155	1156	1157	1158	1159	1160	1161	1162	1163	1164	1165	1166	1167	1168	1169	1170	1171	1172	1173	1174	1175	1176	1177	1178	1179	1180	1181	1182	1183	1184	1185	1186	1187	1188	1189	1190	1191	1192	1193	1194	1195	1196	1197	1198	1199	1200	1201	1202	1203	1204	1205	1206	1207	1208	1209	1210	1211	1212	1213	1214	1215	1216	1217	1218	1219	1220	1221	1222	1223	1224	1225	1226	1227	1228	1229	1230	1231	1232	1233	1234	1235	1236	1237	1238	1239	1240	1241	1242	1243	1244	1245	1246	1247	1248	1249	1250	1251	1252	1253	1254	1255	1256	1257	1258	1259	1260	1261	1262	1263	1264	1265	1266	1267	1268	1269	1270	1271	1272	1273	1274	1275	1276	1277	1278	1279	1280	1281	1282	1283	1284	1285	1286	1287	1288	1289	1290	1291	1292	1293	1294	1295	1296	1297	1298	1299	1300	1301	1302	1303	1304	1305	1306	1307	1308	1309	1310	1311	1312	1313	1314	1315	1316	1317	1318	1319	1320	1321	1322	1323	1324	1325	1326	1327	1328	1329	1330	1331	1332	1333	1334	1335	1336	1337	1338	1339	1340	1341	1342	1343	1344	1345	1346	1347	1348	1349	1350	1351	1352	1353	1354	1355	1356	1357	1358	1359	1360	1361	1362	1363	1364	1365	1366	1367	1368	1369	1370	1371	1372	1373	1374	1375	1376	1377	1378	1379	1380	1381	1382	1383	1384	1385	1386	1387	1388	1389	1390	1391	1392	1393	1394	1395	1396	1397	1398	1399	1400	1401	1402	1403	1404	1405	1406	1407	1408	1409	1410	1411	1412	1413
---	---	---	---	---	---	---	---	---	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------

COLD LAMP PREVENTS HEAT IN PICTURE MACHINE

By means of an electric lamp, which is intermittently lighted and extinguished, a French inventor claims to have eliminated all danger of fire and explosions in moving-picture outfits.

In his apparatus he places condensing lenses in front and back of the film. Behind the rear lens is the "cold-lamp" box, containing a small incandescent lamp with metallic filament. The current is periodically interrupted, so that the lamp is intermittently lighted and extinguished, but so rapidly that, while the filament is given time to cool off during each period of darkness, the impression on the human eye is one of continuous incandescence.

CHURCH WHICH CROSSED NEW YORK HARBOR

The only church on record that has literally crossed New York harbor, recently completed the voyage and now occupies permanent moorings at the dock of the Sailors' Snug Harbor on Staten Island. Since the days of the Civil War, the church, which was built on a barge, was moored in the East River. The room it occupied was needed for docks, however, and after much discussion the moorings that held the structure to the shore, were cast off and it was towed to Staten Island where it was again made fast, and where it will be used by the sailors. It was known as The Seamen's Church.



The Seamen's Church Which was Towed to
Staten Island

FIGHTING THE SNOW IN SWITZERLAND

The Swiss railways encounter the same difficulties in keeping the tracks



Clearing the Way in Switzerland

clear of snow as do the railroads in Canada and many parts of this country following heavy falls of snow. The illustration shows a plow at work on one of the electric railroads of Switzerland.

PAINLESS REMOVAL OF ADHESIVE PLASTER

Dr. E. J. Beardsley, of the Jefferson Medical College Hospital, Philadelphia, has discovered, quite by accident, that oil of wintergreen applied to adhesive plaster will completely destroy its adhesive power in a short time. It is necessary to use only a small amount of the oil, which is applied directly to the plaster and easily spreads itself throughout the adhesive material.

The removal of adhesive plaster from the skin is not infrequently accompanied by considerable pain, especially if the plaster has been placed over hairy surfaces. The oil of wintergreen is said to act under all conditions.

FIREPLACE AND FLOWER BOX COMBINED

One of the pretty ideas of California home builders is the use of growing flowers as an architectural feature. The photograph reproduced herewith shows



Beautifying a Fireplace Chimney

a detail of cobblestones and cement which combines the rustic fireplace with the flower box; a shallow trench under the window being filled with earth and supporting an ivy geranium. Two smaller niches, nearer the ground, contain growing plants, which give a touch of color to the grey stones. The chimney is of burned and broken bricks.

FUMES OF MOTORBOAT ENGINE KILL

That the fumes from the gasoline engines of motorboats may cause carbon monoxide poisoning and death is shown by a case which occurred in New Zealand recently. Five men went out fishing on a motorboat propelled by a 6-hp. engine. One of them, strong, and in good health, crawled forward

past the engine and lay down in the cabin. Soon afterward he was heard to groan, but, as the groans did not continue his companions thought him asleep. When the boat reached shore, two or three hours later, he could not be awakened and a physician was called. Although the face was of natural color and the body warm, there was no sign of heart action or respiration, and all efforts of resuscitation proved unavailing.

At the post-mortem examination the next day, a specimen of the blood, which was of the color of vermillion, was found to contain carbon monoxide to the extent of 50 per cent saturation. As there was no fire on board the boat, the only possible source of poisoning was the engine.

Inquiry proves, according to the Journal of the American Medical Association, that men attending gasoline engines in cabins often have toxic symptoms—headache and dizziness. As a precaution against such possible fatalities, physicians suggest that the supply of gasoline and air be adjusted as accurately as possible to secure complete combustion, and that as much ventilation as possible be insured.

HATPINLESS HATS

Hatpins are not required for several of the new types of toques. Instead, the drapery trimming of the toques is wound rather tightly around the head and lower part of the toque body in a manner which reminds one of the



The Drapery of This Toque is Wound Around the Head and Fastened with Hooks and Eyes

cloths women wind around their heads as a dust protector when cleaning house. The free end of the drapery is fastened by means of hooks and eyes after being wound.

A SPACE SAVER FOR THE BEDROOM

The clothes drawer or hat box shown herewith has a capacity equal to that of a large bureau drawer and takes up room that is not ordinarily used for any other purpose. It slides in and out from either side of the bed. The top edge of each side of the drawer is grooved to fit the long edges of a

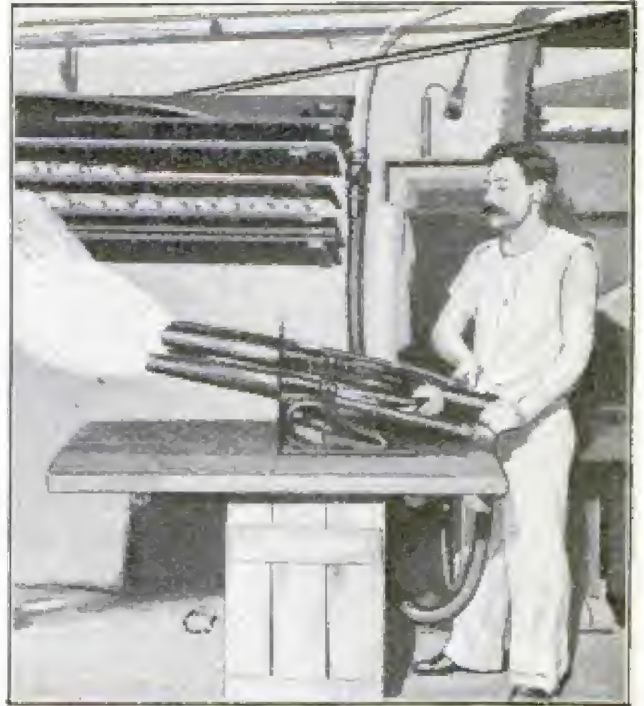


Economizing Space Under Bed

board secured under the side rails. This board acts as a cover when the drawer is pushed in under the bed. The drawer is made of fiber, wood or sheet metal, the first being the preferred material.

GAS TORCHES HEAT BAKING OVENS

Several types of gas torches are being used in France to heat baking ovens. Some of the torches have six or seven Bunsen burners arranged in the form of diverging rays, while others have only one burner, which, however, is of unusual size. The one

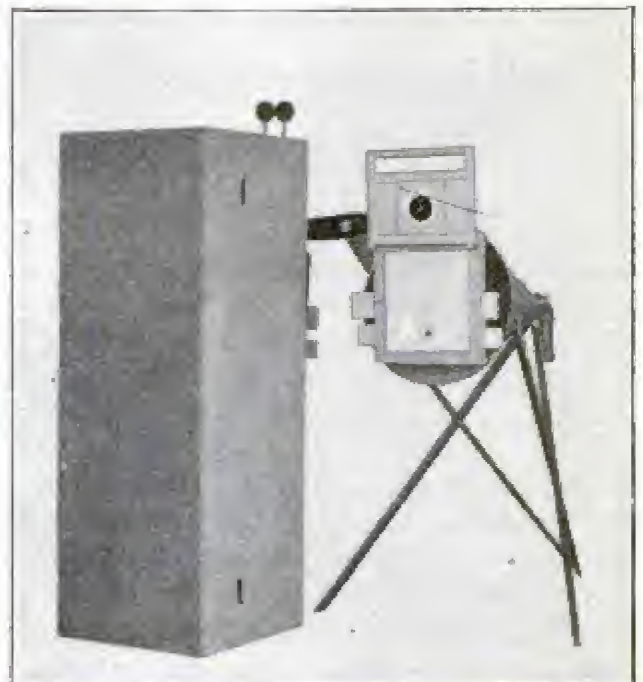


Baking with Gas Flame

shown in the illustration is of the seven-burner type.

CATCHING BULLETS WITH A MEGAPHONE

Catching bullets in a megaphone is not literally the basis of the new indoor target practice device invented by a Michigan rifle expert, but that is what the machine he has turned out and used successfully appears to



Indoor Target Practice and Bullet-Catching Device. Invented by a Michigan Militiaman

do. The machine combines a target and bullet stop which enables the person practicing with it to use the bullets over again, prevents the lead from being scattered all over the floor, and gives a target which is easily "spotted" or marked. The entire device consists of an iron or steel funnel-shaped tunnel, which has all the appearance of a megaphone, 4 ft. long and 2 ft. in diameter at its largest end which is mounted on an adjustable steel tripod beside a booth or upended packing case protected by a steel bottom. The steel-covered portion of the booth and the

fresh target into the view of the marksman while he "spots" the target at which the last shot was fired, and indicates the course of the bullet with a needle-like pointer, which is affixed to the larger bullseye.

SAFEGUARDING GRADE CROSSINGS

A novelty in the practice of protecting grade crossings has been introduced at some of the more dangerous of these intersections of railroads with public highways on the lines of the



Device for Protecting Railroad Crossings

Courtesy the Automobile

wide end of the funnel are turned toward the marksman, the funnel being slightly behind and to one side of the booth. In front of the funnel and bracketed to one side of its mouth is placed a frame containing the targets. The marksman fires, the bullet passing through the targets, which are made of paper, and, striking inside the funnel, the slanting sides of which deflect it to the elbow in the far end, it falls into a receptacle placed to catch it. The shot fired, the spotter in the booth swings the pivoted frame, bringing a

Lehigh Valley Railroad. This consists of a warning device very similar in appearance to the banjo signal which is so largely used on American railroads.

It is about 20 ft. in height and bears a conspicuous caption: "Railroad Crossing. Danger. Do not cross when Red." Audible warning is also given by means of an electrically operated gong. At night time a red light is displayed in place of the red-colored disk, the bell also being used as in day time.

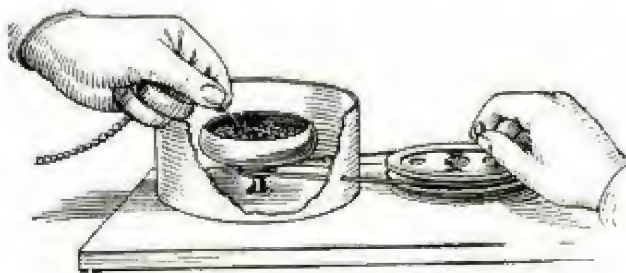
TRAPPING DUCKS WITH SEARCHLIGHTS

Searchlights and wire-screen cages are being used in France to trap ducks at night. The cage, several feet long and about 1½ ft. high, with one side constructed as an easy-swinging trap-door, is placed at the edge of a swamp or lake, with the door side fronting the water. An acetylene searchlight, mounted on a tripod back of the cage, is turned on when a flock of ducks is heard approaching and the beam of light directed toward them. Fascinated by the light, they fly to the luminous point, and all the trapper has to do is to gradually swing the searchlight until the beam projects through the cage, the ducks flying into it.

It is claimed that as many as 80 ducks have been caught in this manner at one time.

BEAD-STRINGING MACHINE

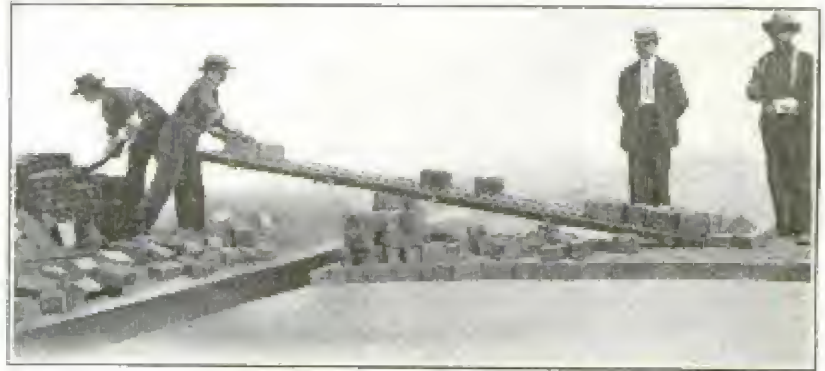
A simple machine which depends more upon chance than anything else in the efficiency of its operation has been invented in France for stringing



French Bead-Threading Machine

beads. The beads are placed in a cup-like receptacle, which is revolved rapidly by means of a wheel, and a bent wire, slender enough to pass through the perforations in the beads, is held in the cup with its point in the opposite direction to the revolution of the cup. There is no law which compels the beads to arrange themselves so as to

become strung on the bent wire when the cup is revolved, but the probability that many of them will is borne out by tests. They crowd rapidly up the wire, from which, with finger and thumb, they may be pushed onto the string to which the bent wire is attached.



Gravity Conveyor in Operation

GRAVITY CONVEYOR FOR PAVING BRICKS

This gravity conveyor is being used on street paving work in Cleveland, Ohio. The frame is made of steel in 4 and 8-ft. lengths, coupled together. The bricks travel by their own weight any distance desired on a 4-per-cent grade, running over steel rollers. It is claimed that the conveyor saves the labor of eight men in supplying bricks to the pavers.

HANDLING ORE WITH ELECTROMAGNETS

Electromagnets are used at the Moose Mountain mines in Ontario, Canada, for loading the magnetite iron ore into cars for the crushers. The ore-bearing material is in the side of a hill, and the mining is of the open type, the masses of rock and ore, loosened and broken up by blasting, rolling down to the bottom of the incline. Here the electromagnets pick it up and load it into the mine cars, at the same time effecting a crude form of separation, as the rock and other non-magnetic material is left behind.

The magnetic quality of this unrefined ore is so great that nearly 1,000 lb. is picked up at a time.

HOW KING GEORGE SELECTED SITE FOR STATUE

A remarkably ingenious method was adopted to enable King George to determine a favorable location in the



Dummy Statue of King Edward on Wheels

Green Park, London, for the proposed memorial statue of King Edward. A flat wooden dummy representing an equestrian statue on a pedestal was placed on a wagon and drawn from point to point. The King watched from a window of Buckingham Palace.

THE SILKWORM'S TASK

If all the natural silk in the world (estimated at 110,000,000 lb.) were extended in one single thread, such as is woven by the looms, it would make a line that would go over $1\frac{1}{4}$ million times round the earth at the equator, or 344 times the distance between the earth and the sun. The speed of light is 186,000 miles a second. But even at this enormous velocity, a ray of light would take about two days to travel a distance equal to the length of this thread. The work of the silkworm will be dimly appreciated when it is taken into account that about six filaments

as spun by the worm in its cocoon go to form a single silken thread such as is spun into fabric by the loom.

BRIDGE BUILT IN ARCTIC NIGHT

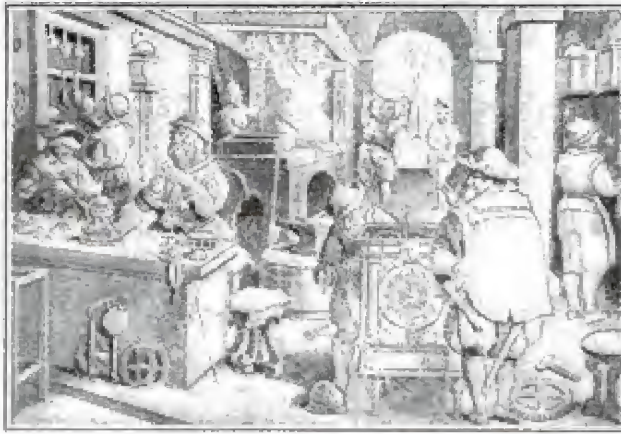
Building a great bridge in the coldest regions inhabited by man, and during the long arctic night, is truly a remarkable performance. Yet this incredible feat was recently accomplished in Alaska when a cantilever bridge was built across the Kuskulana River.

The arctic night was turned into day by the lavish use of electric light, and the pneumatic riveters were enabled to work in spite of the extreme cold by forcing steam along with the compressed air.

The Kuskulana bridge forms the last important link in the Copper River & Northwestern Railroad from Cordova to the Bonanza copper mines at Kennecott, 200 miles distant. The bridge is 225 ft. above high water in the canyon below. It is 800 ft. long, including two 150-ft. cantilever spans, one 225-ft. central span, all of steel, and approaches of standard trestle construction. Solid concrete piers are used for anchorages.



Railroad Bridge Built in Arctic Under Extreme Difficulties



SCIENCE AND MECHANICS IN THE MIDDLE AGES

No. 2.—THE CLOCK MAKERS. Mechanics made great strides during the latter part of the fifteenth and the beginning of the sixteenth centuries, especially in the manufacture of clocks. The application of the hair-spring and the invention of the pocket time-piece are attributed to this period, but the use of the pendulum and the accurate measurement of time did not come until later.

No. 3.—THE OPTICIANS. At the left is the optician with his sign hanging over the street and his customers making selections. The shoemaker, the housewife, the scribe and the reader in and in front of the booths on the other side of the narrow street are wearing spectacles. Lenses, were not applied as an aid to defective eyesight until after the time of Roger Bacon, 1294.

WHO CONTROLS PROPERTY RIGHTS IN THE AIR?

Who owns the air?

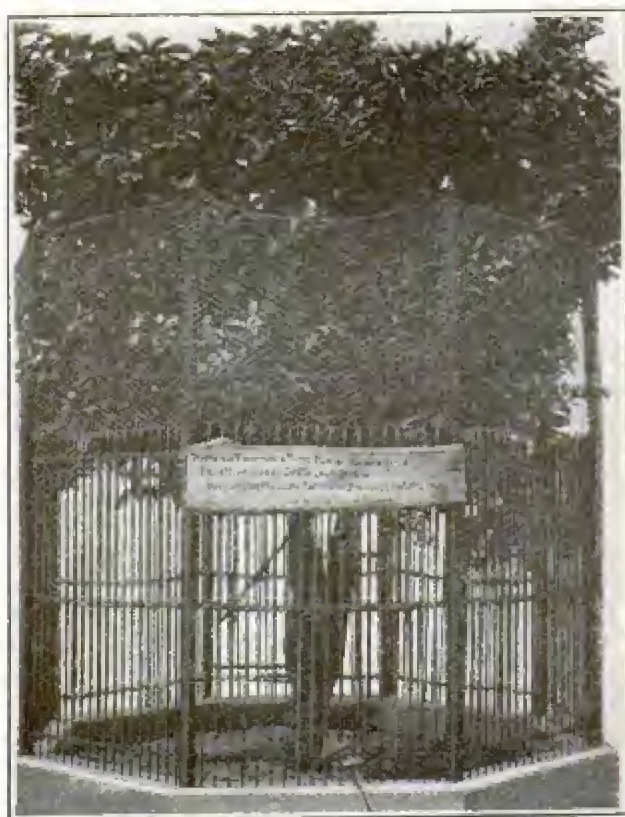
This interesting question has been raised between aviation experts and property owners in France and promises to lead to a long discussion of proprietary rights. Four owners of large estates have instituted proceedings against Henry and Maurice Farman, whose aviation school is near their estates, to recover damages. Their claims have in them something of the ancient dictum that the air above and earth below belong to the owner of the land. The constant flights over their property, the complainants set forth, constitute a nuisance to the property holders personally and cause actual damage by frightening and disturbing the domestic animals and by driving away all the game that formerly was found on the place. They ask damages in the sum of \$1,000 each and an order prohibiting flight over their property at any altitude below 650 ft. with a penalty of \$100 for each violation of such ruling.

The bill of complaint is attacked by airmen on the ground that the property owners show weakness through the prescription of a minimum altitude for flight. The experts claim that game and animals are as liable to be frightened by an aeroplane flying at a height of 650 ft. as lower. They also have asked whether or not it would be prudent to risk the lives of aspiring bird men by compelling them to fly at such an altitude when they have not yet familiarized themselves with the working of an aeroplane. The case has attracted considerable attention throughout France and the newspapers have devoted much space to comment it has provoked.

☞ An English engineer estimates that every fifteenth inhabitant of the British Isles uses a bicycle or motorcycle for business or pleasure. The British postal service alone utilizes 11,400 bicycles.

PARENT OF ALL THE NAVEL ORANGE TREES

The tree from which the navel orange groves of California originated is still growing and bearing fruit in the



Original Navel Orange Tree in California

courtyard of a Riverside hotel. It was imported from Bahia, Brazil, in 1870, by the Department of Agriculture, as the Bahia oranges were known to be finer than any then grown in this country. In 1874 the tree was sent to L. C. Tibbetts of Riverside, where it aroused much interest among orange growers, and the variety of fruit which it produced was given the name of the Riverside or Washington navel. It has been stated that every navel orange tree in California has been produced from this tree, directly or indirectly, and on the occasion of President Roosevelt's visit in 1903, it was transplanted to its present position, the president himself wielding the spade. In order to protect it from the undue enthusiasm of souvenir hunters, the tree is carefully enclosed in iron bars set in concrete. A tablet engraved on a slab of orange wood tells its story in a few words.

MEASURING VERTICAL SEISMIC MOVEMENT

The new seismograph invented by B. Galletzin, of St. Petersburg, is especially constructed for measuring the vertical component of seismic disturbances, which are said to be more important than the horizontal, although not studied in most observatories because of lack of suitable instruments.

The Galletzin apparatus consists of a girder beam, pivoted at one end on a horizontal axis, and supporting a 52-lb. cylinder. The other end carries a coil and a disk of copper, which move within the field of a powerful electromagnet. The girder is maintained in the horizontal position by a vertical spiral spring. The instrument records, not the absolute displacement of the seismograph under the movement of the ground, but the velocity with which this movement takes place, the coil being connected with a galvanometer in order to record the oscillations which are damped by the currents induced in the copper disk. The absolute movement of the ground is derived from a formula.

This type of seismograph is absolutely independent of temperature variations.

FRANCE MAY REQUISITION AEROPLANES

Certain kinds of private property in France, by authority of a law passed in 1877, may be requisitioned for military purposes in time of war. Automobiles of certain classes have been included for some time, and it is now proposed to amend the law to embrace aeroplanes. These machines would, of course, have to be classified, and such types as might be unserviceable made exempt.

¶The announcement is made from Panama that the new formula known to the medical world as "606" has been used successfully in combating malaria.

"GIANTISM" CAUSED BY A TINY GLAND

Huge in stature, with great abnormal limbs that rivaled in length the creatures of mythical story, a giant, John Turner, recently died in Washington, D. C. A special coffin had to be made for his burial, and a moving van used in the place of an ordinary hearse. At the time of his death, Turner weighed 343 pounds; was 7 ft. 7 in. tall, with hands 16 in. long; spread of outstretched arms was 8 ft. 11 in., and his vertical reach 10 ft. 4 in. The illness which eventually ended Turner's life was one of a series of attacks of the so-called disease of "giantism" which marked his life from infancy.

Turner was a teamster. His brain was as small as his body was abnormal, and no one subject could interest him for more than a few minutes at a time. The members of his family were of ordinary size. His rapid growth began when he was about 12 years old. After that, his body, figuratively speaking, "ran away" with itself. Huge as was the rest of his stature, his hands were abnormal, even for his giant frame. He could neither read nor write.

And the cause of all this great abnormal growth of man? Its discovery is one of the romances of surgery. Lying at the center of the base of the brain is a curious little gland about the size of a buckshot; perhaps in size and color it more nearly approaches the common garden currant than any other object. It is known as the "pituitary gland."

Medical authorities conclude that this little pituitary gland exercises a governing influence on the growth of the human body, and when it has reached a normal size it shuts off any further growth, just as the governor on a steam engine shuts off the steam from the engine when the requisite amount of power has been furnished. When this gland becomes diseased, its restraining functions cease and the victim continues to grow at the expense of both mental and physical strength. For there seems to be allowed by nature only a certain amount of vitality

to each individual, and when this is distributed over a vast amount of physical area the whole organism weakens and there is a woeful lack of energy, mentally and physically.

These great human creatures, say the



Giant Who Died Recently at Washington

medical authorities, are always dull in mind. The gregarious instinct in the human, evidenced most strongly in the desire to have companionship of the opposite sex, appears to be wholly lacking. They want merely to get enough to eat, to lie idle and be left alone. In the case of Turner, he did not live, he merely existed. He showed no signs of obtaining an education. His chief form of amusement was to sit and doze, under a broiling sun during the summer months, and in the winter before an open fire. He had but a normal appetite, and alcoholic liquors interested him but little.

A badly designed muffler or silencer for an explosion engine may waste from 15 to 30 per cent of the power of the engine.



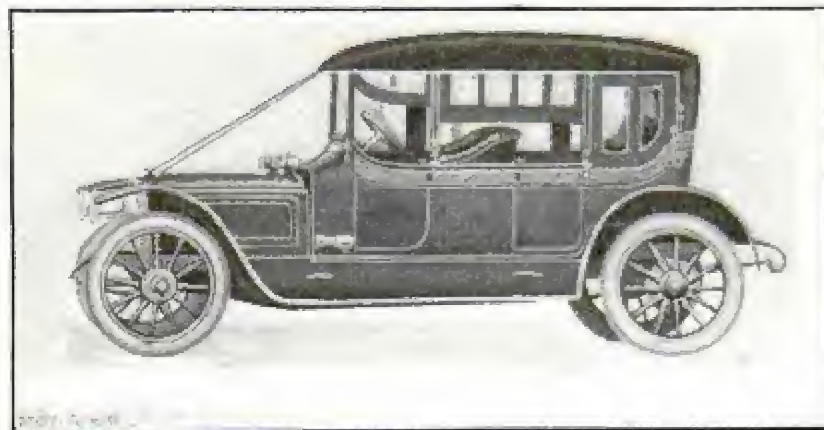
"Demoiselle" Aeroplane Built in Corinth, Miss.

AEROPLANE BUILT FROM MAGAZINE DESCRIPTION

There is hardly a section of the United States where inventors are not at work building and testing aeroplanes of their own pattern or along the lines of the well known machines. The publication of the plans for the "Demoiselle" in Popular Mechanics Magazine last summer stimulated the ambition of many enterprising young men who aspire to be airmen. Two of these live in Corinth, Miss. They have made a machine from the description

given in the magazine. They followed the directions exactly and as a result obtained a finished product which equipped with a 30-hp. engine, weighs 250 lb., 10 lb. lighter than the Santos-Dumont model that was described. This machine was shown at the St. Louis Aero Exhibition and attracted great attention. A photograph of the Corinth machine which the builders sent to the magazine attests their success.

ROLLER SIDE-CURTAIN FOR AUTOMOBILES



New Side-Curtain Which is Operated Like Window Blind

An automobile side-curtain that can be operated like an ordinary window blind, and which is proof against rain, dust and drafts, will shortly be placed on the market by a French manufacturer.

The curtain consists of a waterproof fabric, le into which are mica panes and the design is such that the curtain will fold up with the rest of the hood with-

18

19

20

21

22

23

24

25

26

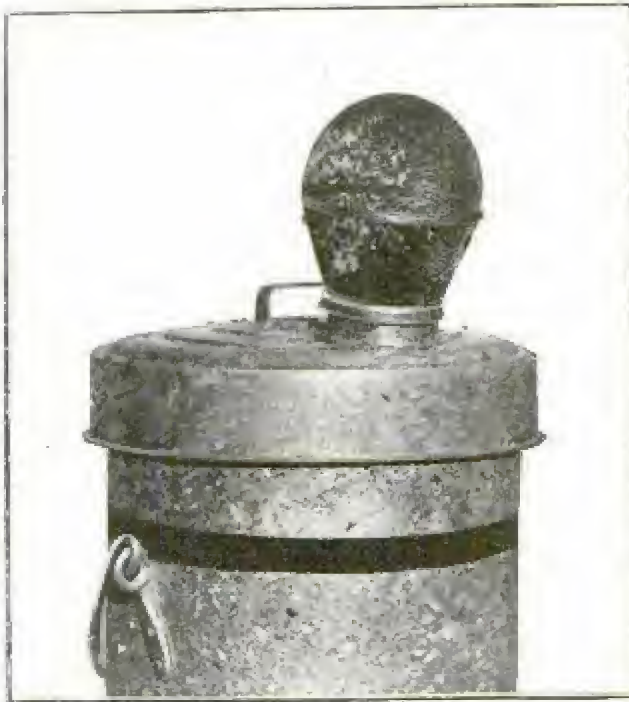
out difficulty. When the hood is spread for use on the machine, the curtain may be drawn up or down like an ordinary window blind.

CONVERTS THE GARBAGE CAN INTO A FLY TRAP

Every garbage can and swill barrel can be converted into a fly trap, if the device invented by Dr. Clifton F. Hodge, of Clark University biological department, be adopted.

The can or barrel is fitted with a loose cover which permits the flies to enter. At the top of the cover is an opening leading to a wire-screen fly trap, and it is a peculiar fact that most of the flies entering the can in search of food will choose to make their exit at the top of the can and thus go to their death in the trap.

This method of killing flies before they get into the house is most effective and was devised after three years' experimentation. It is not patented and therefore may be used by everybody. Should it be generally adopted,



Simple Fly Trap on Garbage Can

it is probable that the annual fly scourge will be greatly diminished, and the health of the community correspondingly improved.



Courtesy Illus. London News
Carnival-Like Scene at the Russo-Japanese Boundary in Manchuria

THE CURIOUS UNIFORM OF CHINESE PORTERS

Instead of wearing caps with the word "porter" across the front, as is the custom in this and many of the European countries, the Chinese porters at Kwan-Chanzee, a Manchurian town on the Russo-Japanese boundary, have the word marked in English letters a foot high running around their blouses. Their business is also marked in Japanese on front and back.

The scene on the arrival of the trans-Siberian express is described by an English writer as not unlike a carnival night, although all the participants wear their everyday working clothes. Mixed in with the weird costumes of the Chinese porters are paper lanterns on sticks, carried by little Japanese policemen, while the Russian train, illuminated with candles, stands on one track, and an up-to-date American Pullman is waiting on another to take passengers to Mukden or Port Arthur.

Wireless communication as a distinct branch of engineering is now being taught at the University of Michigan.

BABY DROPPED IN PILLOWS

Tied up in a bundle of pillows and bedding, a year-old baby was recently



How a Baby Was Packed in Pillows and Dropped to the Ground to Escape a Fire

dropped from the second story of a burning house in Chicago. Almost stifled by smoke before awakened, the mother hastily fastened the pillows around the child, leaned as far out the window as possible, and dropped the bundle a distance of about 20 ft. to the sidewalk. Then she climbed out on the roof of a porch and a few moments later was helped to the ground, where she found the baby none the worse for the experience.

BIG GAS AREA IN NEW BRUNSWICK

A big gas and oil area, the extent of which has not yet been determined, has been discovered near Moncton, New Brunswick, and 15 gas wells have already been sunk. The last well reached gas at a depth of 1,430 ft., and its flow, estimated by the force of escape, is about 6,000,000 cu. ft. per day. The well holding the record for gas flow has a discharge estimated at 12,000,000 cu. ft. per day. The record pressure for any of the wells is 640 lb. per square inch. The oil is in the strata underlying the gas.

PHOTOGRAPHING THE VOICE

A French scientist has invented an apparatus by which the vibrations of the voice may be reproduced on sensitive films as are tangible objects in ordinary photography. The sounds strike a small disk of india rubber, the vibrations of which are reproduced in a small mirror. A ray of light, thrown on the mirror, reflects the vibrations at various angles on a sensitive film which is unwound by clockwork. According to the inventor, the reflections making the picture will indicate if a singer's voice is true, if his tempo is correct, and if his method of breathing is right. A true note is shown in the picture by a series of

parallel equal bands.

STRANGE SUBSTITUTE FOR AUTO WHEELS

This is not a 1911 model, but on account of a broken axle the high wheels were used in moving the automobile to a St. Louis repair shop. The wheels were 6 ft. in diameter and had for an axle a piece of 2¼-in. steel shaft from which the weight of the rear end of the automobile was suspended by means of ropes. The wheels are ordinarily used for moving and unwinding heavy reels of underground cable.



Moving an Automobile to Repair Shop

RAISING SWEET PEAS FOR PROFIT

THE man who has some spare time and an unproductive piece of ground that he desires to turn into money, nine times out of ten considers first the growing of vegetables or the raising of poultry. But, while everyone must eat, prospective gardeners seldom stop to estimate how many millions of dollars are spent for other things—flowers for instance.

many sections of the country as vegetables, easier to market and require no more care in the preparation for sale. Sweet peas will not grow themselves, but given the same amount of attention that a vegetable garden or a poultry yard requires, they are likely to be more profitable than either, and more certain. A young man in Independence, Mo., just out of high school,



One of the Sweet-Pea Patches Covering One-Third of an Acre—A Boy Made \$800 by a Little Work on This Small Piece of Ground

Almost everybody who grows flowers has a sweet-pea patch, yet florists never have an oversupply of the fragrant little blossoms. Therefore, the man or the woman who desires to turn spare time and vacant ground into cash, will find the cultivation of sweet peas one of the surest means to that end. Near the larger cities there is always a market for them and, if one gives them his or her whole attention a profit of \$500 to \$1,000 is not too large to expect. A man with a family to help him ought easily to clear the latter amount in a season.

Sweet peas are as easy to grow in

cleared \$800 on less than an acre of sweet peas last year, and when he balances accounts this year on an acre of them he expects to show a profit of \$2,000 or more. When he started in this young man knew no more about growing sweet peas than the average high school boy does. Placed in charge of the home garden, he planted a small patch of sweet peas for table flowers. They grew so luxuriantly that thousands were given to neighbors or thrown away. A neighbor suggested that he sell those he didn't use. A florist agreed to take all he would bring, giving him instructions about preparing them for sale. That year he



Another Sweet-Pea Patch, Showing Greenhouse for Winter Culture

received nearly \$100 for his flowers. Last year he cleared \$800, meantime studying up on sweet-pea culture.

He had been planting ordinary home-grown seed, but this year he bought seed in California, planted early and late varieties, picked his flowers with more care, arranged them according to colors, made his bunches neat and uniform and at the height of the season sold as many as 25,000 blossoms a day. They were tied in bunches of 28.

At the season's end the plants were allowed to go to seed, and this seed he sells to dealers for home pea patches. Now the young florist is building a greenhouse to grow sweet peas in winter and further increase his income. Next year he will have about two acres in sweet peas and expects to clear \$5,000.

In growing sweet peas, the preparation of the seed bed should, if possible, be started in the late fall. The ground should first be given a good coating of manure and then plowed. Before freezing weather, the ground should be cross-plowed and harrowed. In the early spring it should be plowed and harrowed again and allowed to lie until planting time, when it should be

harrowed again. The best seed should be used, and it should be planted in shallow trenches 4 ft. apart. After the vines reach a height of about 4 in., they should be thinned out and the space between the rows covered with straw or stable refuse. This keeps down the weeds and retains the moisture in the soil. Brush is the best support for the vines, giving them a chance to spread and thus increasing the number of flowers.

The flowers are picked in the evening and the early morning, and, when possible, should be stored until marketed in a cool cellar. Care should be taken to pick only long-stemmed and perfect flowers, the others being picked off later and thrown away. This keeps the flowers from going to seed and reducing the number of blooms.

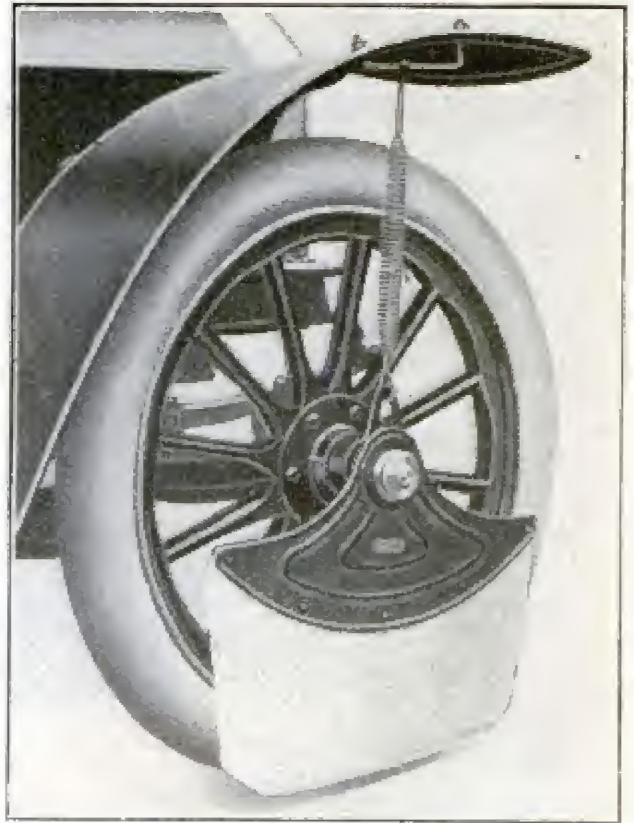
¶ Parabolic reflectors of solid silver rolled on copper are among the latest refinements in automobile headlights.

¶ A gasoline-driven plow has been reported to have turned over 25 or more acres a day, at a cost of about 50 cents per acre.

STEEL-MESH SPLASHGUARDS FOR AUTO WHEELS

The municipal authorities of London have taken under consideration the complaints of pedestrians that mud-baths are forced upon them every wet day by motor-omnibuses and other street vehicles. Consequently, several tests have been made of a steel-mesh splashguard designed to keep the mud from flying outward when a wheel drops into a puddle.

The splashguards are suspended from the hubs of the wheels, the bottoms reaching to within a fraction of an inch of the ground, and forming a shield between the wheels and pedestrians. In one of the tests a white screen was erected on a suburban road near a mud puddle. Only a few tiny drops of mud were splashed upon it by a motor-omnibus equipped with the shields, while a broad, checked pattern of black and white resulted when the splashguards were removed.



Steel Mesh Shield Prevents Mud from Flying Outward from Automobile Wheels



Old Rain Gauge at Taiko, Korea

AN ANCIENT RAIN GAUGE

The first use of the rain gauge has been credited to Benedetto Castelli, an Italian contemporary of Galileo, but recent research shows that rain gauges were used in the 15th century, nearly two centuries before. In the second volume of the historical annals of Korea is found a reference to rain gauges which translates as follows:

"In the 24th year of the reign of King Sejo (1442), the king ordered constructed a bronze instrument to measure the rainfall. It is a vase resting on a stone base, and was placed at the observatory. Each time it rained the attendants measured the height of water in the vase and reported to the king. Similar instruments were also placed in all the provinces."

A retired sea captain on the Pacific Coast is engaged in raising sea gulls to obtain their eggs, for which there is a large market and which compare favorably with hen's eggs.

DECORATED CHIANTI BOTTLES

Chianti flasks are often decorated in a manner shown in the illustration for special purposes, such as banquets and for sale during carnival weeks, etc. This cork probably represents a drink demon.



THE LONGEST CITY TRAIN

The heavyweight record in city passenger-carrying was established recently in the New York subway by the installation of its new 10-car express train service, this being the first time in the history of municipal traffic that a train of

such length has been used.

Before inaugurating the new service, which gives seats to 10,000 additional passengers hourly, with a corresponding increase of room for less fortunate strap-hangers, an expenditure of \$8,000,000 was necessary. For additional power apparatus and system changes, an outlay of one million dollars was made; the lengthening of stations to a point where passengers could be taken on and discharged by 10 cars simultaneously consumed another two millions; while the bill for new cars alone ran up to five million dollars.

The empty single car, 50 ft. in length, weighs about 77,500 lb. The entire 500 ft. of loaded train in actual service would tip the scales, figuratively, at 500 tons,—or a weight of one ton for every linear foot of trackage.

Permanent magnets of cast iron are now being made on a commercial scale. The saving in cost of manufacture over those made of steel is said to be from 25 to 50 per cent.

POWDER MANUFACTURE SAFE IN FRANCE

Incredible as it may seem to the general public, a French scientific magazine asserts that the manufacture of powder and explosives in general is one of the safest industries. Statistics in France prove that the percentage of deaths and injury in such factories is among the very lowest of all factories. This is accounted for by the extreme precaution taken to prevent accidents and the care exacted from the workers.

COMBINATION LAVATORY AND REPOSITORY

The convenience depicted herewith has been designed as an aid in the home, factory or hotel. Under the lavatory basin is a receptacle provided with an outlet and an overflow. Towels may be hung inside this receptacle from a heavy brass strip secured around the top just below the basin, and thus be kept out of the way or left in soak before washing.



Handy Receptacle for Soiled Towels Under Wash Basin

354 AIRMEN LICENSED IN FRANCE

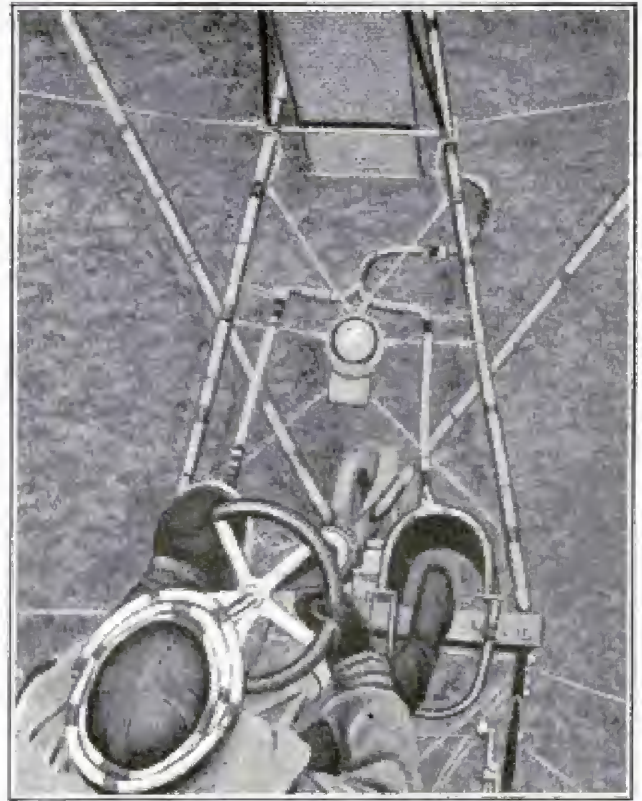
Since December, 1908, when the French Aero Club adopted regulations for airmen, a total of 354 have received licenses, 336 being given in 1910. The holders of licenses include four women, all French. As showing the preferences of airmen for the different types of machines, it is interesting to note that 180 used biplanes in the license-gaining trial flights, and 174 used monoplanes.

MOTORISTS COMPETING IN CAPE-TO-CAIRO TEST

An international motor contest from Capetown, South Africa, to Cairo, Egypt, was recently started by teams representing British and German interests. The contest is over a course 5,800 miles long and it is the hope of the motorists to complete it in 120 days. The British team left Capetown on Jan. 25 and the Germans started two weeks later to go over a slightly different route. The contest is being watched with intense interest by the commercial concerns and the governments represented, for, although it is not strictly a race, inasmuch as the two teams do not start together and go over the same route, the interests involved regard it as such, because of the intense rivalry and the rewards offered for success. The German government has backed the team representing Germany with a subsidy of \$50,000. The men in charge of both cars have had considerable motoring experience in Africa. Gasoline and other supplies have been placed at convenient points along both routes.

INGENIOUS DEVICES ON CODY'S AEROPLANE

This view of S. F. Cody's British aeroplane, taken from above, shows the many ingenious devices with which he has equipped it. His feet are kept warm by pipes connected with the engine and the radiator in front. The



Aeroplane Equipped with Foot Warmers, Watch, Compass and Mirror

air, passing through the radiator, is warmed before it passes into the pipes. On the framework in front of the airman is a watch and compass, and by his side is a mirror which enables him to see behind.

Cody is the American who built and experimented with England's first aeroplane. He won the British Michelin prize for 1910 by a flight of 183 miles in 4 hr. 47 min.

STEAM RAILROAD TRAINMEN ON ELECTRIC ROADS

Recent investigations by the railroad commissions of Indiana and Illinois are said by the Electric Traction Weekly to indicate that experienced steam-railroad trainmen do not make the best motormen and conductors for high-speed interurban roads. It is claimed that the steam-road employe is machine-like in his methods, and that it is difficult to impress upon him the difference between a 40-car freight train and a single-car interurban. He is said to be apt to regard the interurban car as something of a toy.

ALUMINUM WATERFALL AS BOILER-SCALE CURE

The two methods generally used in treating water to prevent scale in boilers consist of softening the water



Running Water Over Aluminum Plates as a Means of Boiler-Scale Prevention

before it is supplied to the boilers, and the introduction of chemicals into the boilers to minimize the formation of scale. There is a third method, however, now being used by three railroads

in England, which requires no chemicals, nor an extensive plant for settling purposes.

The treatment of this method is simplicity itself, the process consisting of nothing more complicated than allowing the water to flow over an aluminum-plate fall placed between the inlet and the storage tanks. The apparatus is automatic and uniform in action, and requires no attention beyond an occasional brushing to keep the aluminum plates bright and clean.

The passage of the water over the plates disintegrates the calcium and magnesium compounds in such manner as to prevent their deposition as a hard scale on the boiler plates and tubes. Instead, the deposition appears as a soft mud, considerably less in bulk than scale otherwise formed, and easily removed by ordinary washing or dry brushing. Water so treated is also claimed to soften scale previously deposited.

WATER RESISTANCE OF DUCKS

Rather interesting tests of the water resistance of ducks and geese have been made by Tatsugoro Inouya, a graduate of the Naval Architecture Department of the Tokyo Imperial University, who is studying water-fowl forms in comparison with fine-lined ship forms.

The tests were made in the running water of the River Katase, as there



Measuring the Resistance of a Duck Against the Flow of a Japanese River

were no instruments available for computing resistance when towing the birds in still water. The webs of the feet and the wings were tied up tightly before the duck or goose was placed in the water, and the resistance against the water was measured by a spring-balance. The speed of the water flow was 157 ft. per minute, and the resistance of a duck against it was shown to be 0.385 lb., and of a goose 0.510 lb. Owing to the oscillations of the spring, considerable difficulty was experienced in reading the spring-balance, each observation occupying from 5 to 10 minutes.

The experiments are said to show, for a large range of speed, that the bird form has a distinct advantage over that of a fine-lined ship form having the same length, breadth, draught, and displacement.



Montgomery Street, Looking Toward Market Street. A Corner of the New Fourteen-Million Dollar Hotel is Shown in Center—Four New Bank Buildings Also Shown.



Market Street. No Evidences of Earthquake and Fire of 5 Years Ago—It is Now a Well-Paved Chasm Five Miles Long, Flanked on Either Side by Handsome New Structures.

THE NEW SAN FRANCISCO

rival and a good loser and when the decision was rendered the New Orleans fair authorities declared the intention of New Orleans to take a prominent part in the exposition in San Francisco, and to place a great exhibit there.

Before formally appearing before Congress, San Francisco had guaranteed a fund of \$17,500,000 toward the exposition. An enabling act was passed by the state legislature authorizing the issuance of \$5,000,000 worth of bonds by the state of California and \$5,000,000 worth by the city of San Francisco.

The opening of the Panama Canal will mean perhaps more to the Pacific coast than any event since the discovery of the Pacific Ocean by Balboa, the advent of Lewis and Clark, or the driving of the last spike in the Union Pacific Railroad in 1868. Take a map of the Pacific Ocean and trace the most direct route to the ports of the Orient, following the great circle, and you will face the surprising fact that

ships bound from the Atlantic through the canal to China and Japan, the Philippines, Siberia or Siam, pass within 165 miles of the Golden Gate. The prospect of the early completion of the canal is already having a direct effect in stimulating Pacific coast shipping. Within the past year, a large steamship firm has engaged in freight traffic between San Francisco, the Isthmus and Atlantic coast ports. Even under the present necessity of transporting freight across the Isthmus, business of the line is more than doubled.

The canal will probably cut in half freight rates on California fruits to the east, and will create a large, new market for pine and fir from Puget Sound, and redwood from California. Emigrants to the west will be enabled to come from Europe through the canal direct to Pacific coast ports, and future lines through this direct connection are rumored. The opening of the canal will give a tremendous stimulus



View of Golden Gate Park Where Exposition May Be Held

SAN FRANCISCO GETS THE FAIR

By HAMILTON WRIGHT

Within five minutes from the time that the national House of Representatives cast its vote in favor of San Francisco as the place in which to hold an international exposition to celebrate the opening of the Panama Canal, bands were parading Market Street, sirens on the water front were pulled wide open and the streets of the city were thronged with great smiling crowds. The outburst of popular enthusiasm exceeded anything since Spanish war days. All business was cast aside for the moment and a judge excused a jury until they could regain their composure.

San Francisco started working for the world's fair in 1904 and a provisional corporation was formed at that time to take care of the movement. The catastrophe of April 18, 1906, put a temporary damper on the movement, but in a few days after the fire, banners announcing the fair 1915 were displayed among the ruins. In March, 1910, a permanent world's fair corporation was formed and on April 28,

1910, the active money-raising campaign began. A mass meeting was held in the Merchants Exchange Building on that day, and in less than two hours people of all occupations subscribed \$4,089,000 to the shares of the fair corporation. The sale of stock was actively pushed and within a few months \$7,500,000 worth had been raised from stock sales as a starter for the exposition movement.

Californians looked upon the fair as practically assured, but last spring it developed that New Orleans, also a suitor for congressional favor, was putting up an energetic and straightforward fight and seemed to have secured the favor of a majority in the House of Representatives for their claims. San Francisco immediately sent delegation after delegation to Washington and throughout the East, and secured the backing of the western senators and congressmen, with the result that when the matter came to a vote, San Francisco won. New Orleans proved a generous and worthy

to the California oil industry, since oil, being cheaper than coal and more easily handled, may be taken by tank steamers from San Luis Obispo and Port Harford to receiving tank stations on Atlantic ports, where it will be kept in quantities for large consumers.

The restoration of San Francisco is one of the marvels of American cities. The loss through the big fire in 1906 is computed by the insurance underwriters at \$400,000,000. As against this there was \$225,000,000 carried on insurable property, of which \$185,000,000 was collected. Since the fire, building permits have amounted to more than \$202,000,000.

The fair management has not yet selected a site, although a poll taken by one of the San Francisco newspapers indicates that Golden Gate Park, comprising 1,013 acres, and with much adjoining vacant property, is preferred by a majority of the people. Tentative plans for the exposition favor a lagoon in the shape of the Pacific Ocean with the buildings grouped around it. Eight western states through their legislatures have already voted appropriations for state buildings and exhibits. Pledges from China, Japan and the Philippines total \$6,000,000. The directors have promised a \$50,000,000 exposition.

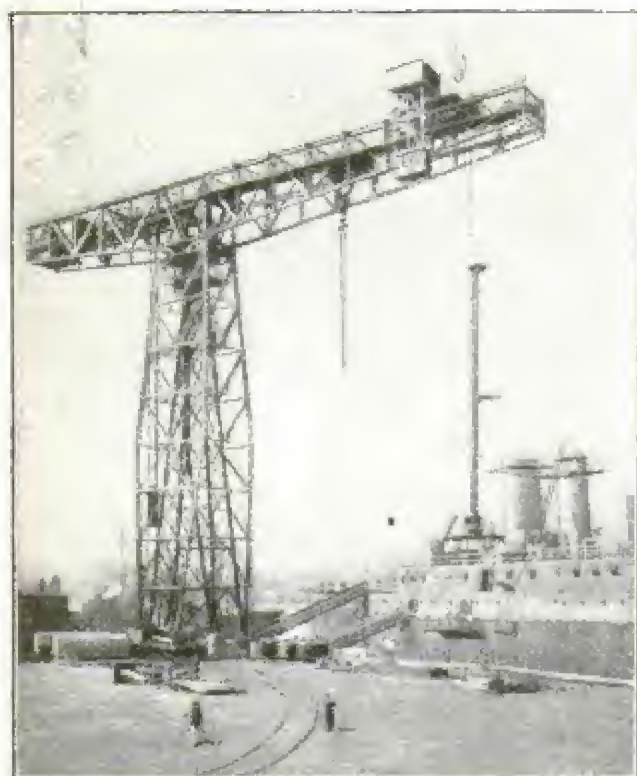


SPORT FOR THE IRON WORKER

The men who bolt together the massive structures of steel for great buildings take delight in going to and from their lofty perches in the same manner the steel girders are raised to the heights where they are destined to rest. A remarkable photograph was recently made of a workman going aloft on the new Whitehall Annex building in New York, the photographer making the picture from a perch in the new building, and showing not only the iron worker suspended between heaven and earth, but also an exceptionally clear view of the New York waterfront.

ELECTRIC CRANE 172 FT. HIGH

The giant 150-ton electric crane erected at the side of the fitting-out basin of the Penhoet shipbuilding yard



Giant Electric Crane Shipping One of the Masts of the French Battleship "Diderot"

at St. Nazaire, France, is one of the largest in the world. It consists of a central latticed column 134½ ft. high, provided at the top with a roller path, on which rests the crane proper. There are two tracks in the jib, the lower one carrying a crab operated by two 50-hp. motors. The upper track carries a 15-ton traveler which can run to the extreme end of the jib. The lower track is 163 ft. above the quay level, and the higher one, 172 ft. The crane can lift 150 tons at a 65-ft. radius, 100 tons at 90 ft., and 60 tons at 124 ft.

CARTRIDGE-MAKING MACHINE

According to a Paris journal, Captain Von Henriquez, of the Austrian artillery, has built a wonderful apparatus for making cartridges. It suffices to introduce the powder, bullets and cases—the machine does the rest. The cartridges come out ready for use, the imperfect ones being thrown aside. Three men can manufacture 1,500 cartridges in three minutes with the apparatus.

SONNET ON A BROKEN TEST-TUBE

By CHARLES M. DISERENS

Fair little test-tube, when I see thee there
Reclining idly in that ancient rack,
Fond memory leads my recollection back
To those old days now past when free from care,
I warmed thee gently in the Bunsen glare,
Producing hydrogen to make a sound,
When our professor wasn't looking round.
For those dear memories fain would I spare
Thy mutilated, venerable form;
Cracked, broken, shattered, worn and useless now
Doomed to adorn the graceless garbage heap
The dire result of youthful ardor warm;
Which plunged thee hot in frigid H_2O .
And thus unmindful, caused thy endless woe.



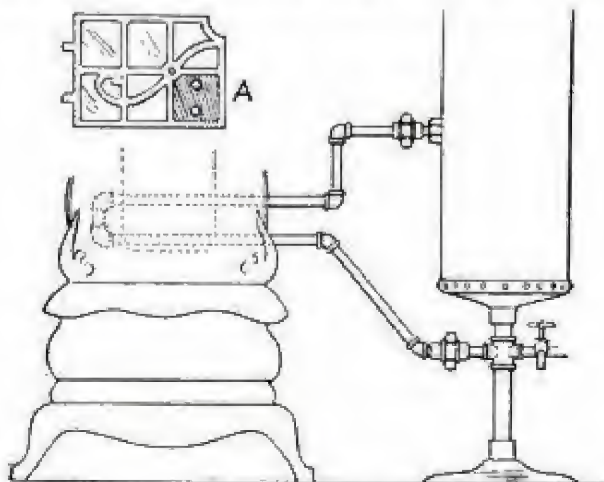
Shop Notes

Base Burner as a Supply-Water Heater

A base burner can be made to heat the water in a kitchen-range boiler as well as in a kitchen range having a water front. Two $\frac{3}{4}$ -in. iron pipes, from 12 to 16 in. long (depending on the size of the stove), are connected together with a return or a combination of two elbows to take the place of the water front. This is placed behind the coal feed and above the fire pot at the rear of the firebox, as shown in the illustration, the ends of the pipes extending through a piece of tin, A, used instead of the mica in the side door.

From these pipes the ordinary connections to the range boiler are made. The top pipe must have some slant upwards to the connection in the side of the boiler. The pipes are not fastened in the stove, as their rigidity, when connected, is sufficient to keep them solid.

A continual supply of warm water, well-heated rooms and no ashes to

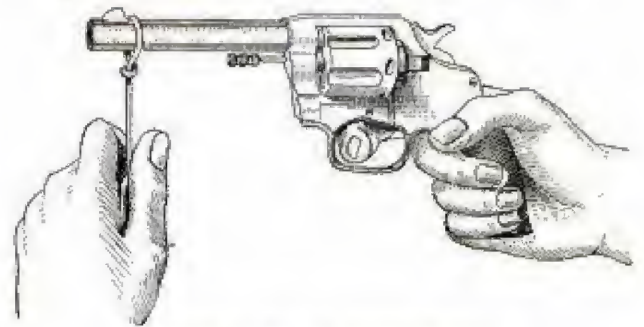


Coil in Heater

sift, recommend this device especially to those who cook with gas, as water is heated with little or no extra expense.—Contributed by Lloyd G. Miller, Chicago.

Holding a Revolver Steady

Paying a fancy price for a knife or razor does not insure getting a perfect blade. Similarly, in purchasing a re-



Holding End of Barrel Down

volver of large caliber, the largeness of the price does not necessarily enable one to get a weapon that will not kick. Some are so violent that accurate shooting is sometimes impossible, and the novice almost believes he will never learn to handle the gun he selected.

The sketch shows a wire device made to be slipped over the barrel just back of the sight and held in the left hand to serve in holding down the upward kick. This will steady the revolver in target practice and yet not cause the user to suffer powder burns as when holding the barrel with the hand.—Contributed by Victor Labadie, Dallas, Texas.

☞ A scribe made from hard brass wire gives a fine light yellow mark on black metal surfaces such as stove-pipe material, boiler plate, etc.

☞ Where oil will not act as a cooling agent on a drill working in hard metals, turpentine used instead will permit the drill to take hold and retain its temper.

Fastening Bolts in the End of Bamboo Poles

A good way to fasten a bolt to a bamboo pole for use in aeroplane construction is shown in the sketch herewith.



Fig. 1



Fig. 2



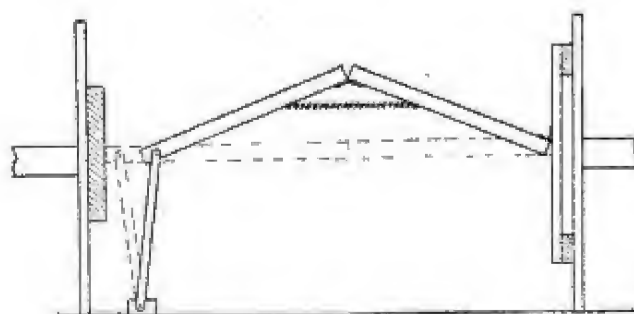
Fig. 3

The end of the pole is cut with a hacksaw so as to form four or six pieces about $2\frac{1}{2}$ in. long (Fig. 1). A hardwood plug is made tapering (Fig. 2) and a hole bored through its center for a bolt. The bolt should

fit tightly in the hole so that it will not slip back when the nut is removed. Slip the plug into the slotted end of the bamboo with the large end first and wind tightly with No. 18 wire (Fig. 3). This will draw the slotted end of the bamboo in closely about the tapering plug.—Contributed by F. W. Stromer, Gig Harbor, Wash.

A Toggle-Joint Press

A quick-acting and powerful press that will find many uses in the shop



Press Open

may be made in a few minutes, if constructed according to the sketch. Supports should lead from the top and bot-

tom of the press to the ceiling and floor to take care of the thrust. The upper of the two pieces forming the toggle joint is fastened by a hinge to a wood strip supported only at the ends. This forms a slightly yielding spring which will be found quite necessary. The dimensions of all pieces depend on the work, but the proportions shown are about right. Do not use too heavy material, as it will be cumbersome. If the toggle-joint members are 1 in. thick and 2 in. wide, they will be strong enough for ordinary use. A piece of leather should be nailed over the crack between the joint members, as otherwise the fingers may be seriously hurt, if caught in the crack as the press is pushed home.—Contributed by C. W. Nieman, New York City.

Wheelbarrow Handle Shield

The hand shield shown in the sketch was adopted in a shop where it was necessary to use a narrow doorway through which to convey material from one department to another, and chafing of knuckles was quite frequent and often painful. This annoyance has been entirely eliminated since the adoption of the hand shield.



The shield is made of a piece of strap iron bent as shown and attached to the wood handle with screws. The shields can be attached to iron handles with rivets.—Contributed by W. E. Roberts, Allentown, Pa.

An Improvised Safety Light

A pair of scissors had been dropped down 8 or 10 ft. between the studdings from the floor of an unfinished attic room. On trying to fish them out with a magnet, considerable trouble was experienced in dodging nails and other obstructions protruding from both sides of the walls. The space was too narrow to admit of an ordinary lantern

being lowered. There being no electric light, a short piece of candle was placed in a glass tumbler that had been securely fitted in a wire loop in such a manner that it balanced right side up when suspended from another piece of light wire. The tumbler containing the lighted candle was lowered to the bottom of the cavity and illuminated the place so well that it became an easy task to raise the scissors by means of an old telephone magnet and a piece of string. A bucket of water was kept close at hand in case of accident from fire.—Contributed by John Teigen, Lake Mills, Ia.

How to Fold Overalls and Jumper

This series of sketches shows a neat and quick way to fold overalls and jumper. After thus disposing of them once or twice, it will become a habit, and it really takes no more time than to throw the outfit in a corner or to gather it up roughly and rearrange it when again used. 1. Lay overalls flat and place the folded jumper on one of the legs. 2. Half fold over leg and jumper. 3. Fold over to top from fork. 4. Roll the folded part over toward length of other leg. 5. Turn the loose leg inside out and pull it over the rolled leg and jumper. 6. You now have a neat, compact parcel. Any tools you may wish to carry with the overalls and jumper may be pushed down the leg



FIG. 1

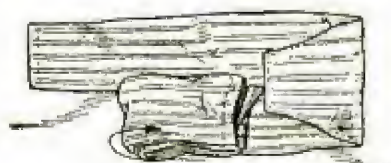


FIG. 2



FIG. 3

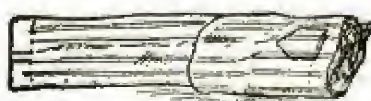


FIG. 4



FIG. 5



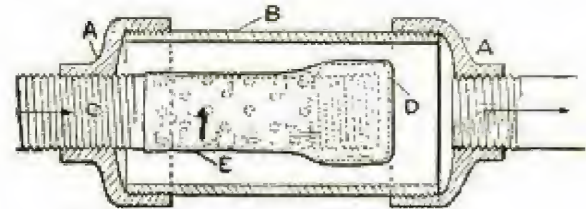
FIG. 6

A Neat Way to Fold Overalls and Jumper

and will thus be safely stowed and much more conveniently than if carried in a pocket.—Contributed by Amos Lithgow, Chicago.

An Air Check Valve

When installing a compressed-air tank in my shop I had trouble with leaks through the ordinary check valve. I could not find a valve that would hold



Made of Pipe Fittings

the pressure for any great length of time. I set about to make one which resulted in the device shown in the sketch. The parts were made of pipe and fittings.

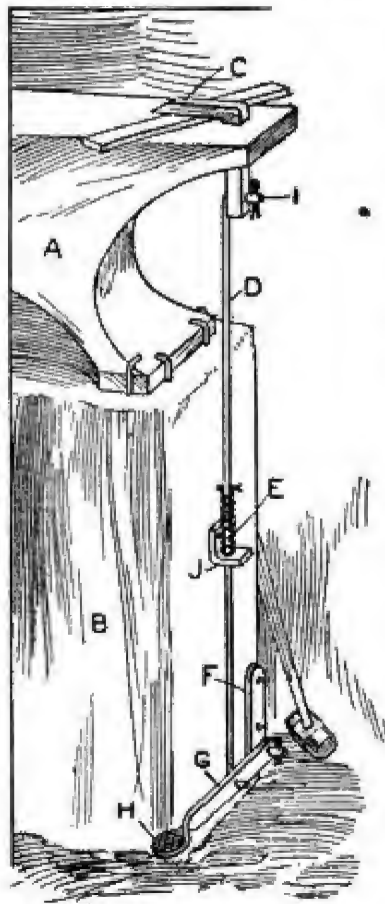
A number of $\frac{1}{8}$ -in. holes were drilled in the pipe C, which was covered with a cap, D. The cap and holes in the pipe were covered with a piece of inner tube, E, from a bicycle tire, and the pipe turned into the reducer A. Two or three thicknesses are used for high pressure. The two reducers, A A, are joined with a larger pipe nipple, B. The direction of the flow of air is shown by the arrows. The air coming into the pipe C will force itself out from under the rubber tubing which keeps it from flowing back through the holes.

The tank was made airtight by pouring in 1 gal. of liquid tar and rolling the tank around until it was well coated

on the inside, then the surplus tar was emptied. Pipe leaks were overcome in the same manner.—Contributed by E. E. Docker, Berkeley, Cal.

Mechanical Helper for the Anvil

The device illustrated herewith is designed to take the place of the human



helper at the anvil in many a job ordinarily requiring two men.

Forge an angle piece, C, to fit snugly but not tightly into the hardy hole of the anvil A. In one end of this angle drill a hole to take the bent-over end of the rod D, and secure this end by cotter pin I. On the front face of the anvil

block B secure the guide piece J for the rod, on which, just above J, is placed the compression spring E, which is held to place by the cotter pin above it. The lower end of rod D extends to within a few inches of the floor, and is bent at right angles to pass through the hole in the foot treadle G, the step of which is shown at H.

The action is simple. The spring E normally holds the gripping piece C well above the anvil face. The piece to be held is placed in position under C, and foot pressure on H causes C to grip the work as tightly as may be required. Releasing H causes spring E to press up rod D and release C from the work.—Contributed by J. N. Bagley, Webber, Kansas.

Iron or steel may be made rustproof by boiling in 1 gal. of water to which is added 4 oz. of phosphoric acid and 1 oz. of iron filings. A black noncorroding coating is produced.

To Keep Windows Free from Frost

How most effectively to keep show windows from frosting in cold weather is to many an important consideration. A correspondent of the Optical Journal gives a cheap and simple method which is worth knowing. It consists of polishing the glass, after first washing in the ordinary way, with a piece of chamois skin on which have been scattered a few drops of glycerine. He says that this treatment is just as effective as the application of a proprietary article formerly employed by him with most satisfactory results.

Calipering over Flanges

A pair of outside and inside calipers especially constructed for calipering over flanges is shown in the sketch. These calipers have many advantages for measuring the thickness of metal back of a flange or an enlarged part in a bored hole.

These calipers should be made with all legs of equal lengths. The readings can be taken on a rule while the cali-

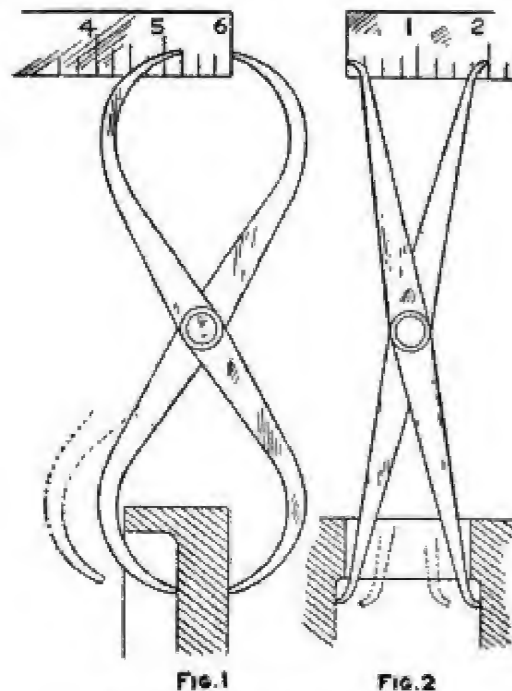


Fig. 1 Fig. 2
Outside and Inside Calipers

pers are set over a flange as in Fig. 1, or inside of a hole, as in Fig. 2.—Contributed by Philip J. Duff, Montreal, Canada.

A Hot-Water Incubator

A hot-water incubator possesses several important points of superiority over the lamp-heated kind. In the first place, it can be operated anywhere without danger of fire; secondly, it has a very steady temperature and consequently will produce healthier chicks; and thirdly, it is so simple in construction that with the exception of the tank, which any tinsmith can make, any person at all familiar with the use of a hammer, saw and plane can easily make one.

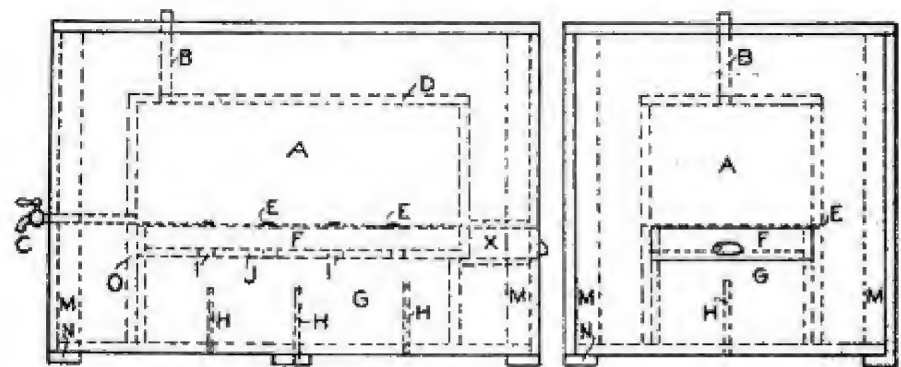
To construct a 100-egg machine have a galvanized-iron tank, A, made 12 in. deep, 15 in. wide and 30 in. long. There should be a pipe 1 in. in diameter and 9 in. long placed in the top for filling, and another of the same dimensions and ending in a faucet in the bottom for draining. Inclose all but the bottom of this tank with a close-fitting box of 1-in. wood, D, to keep the tank in shape when filled, and fasten strips of strap iron, E, crossways every 6 in. beneath the tank to keep its bottom from sagging into the egg tray.

The egg tray F is 3 in. deep, 15 in. wide and 37 in. long, outside measurements. Partition off the part X and make a box of it. Pack this with sawdust (as it forms the front of the egg tray) to keep the heat from escaping. Fit in four crosspieces for the bottom of the egg tray proper, and stretch wire window screening, J, over them, tacking it securely to the sides and ends.

The ventilator G is a frame of 1-in. material, 8 in. deep, 15 in. wide and 30 in. long, outside. There is no top to this ventilator, but it has a bottom which projects 6 in. on both sides and ends. Three tubes, each 7 in. long, are placed in the bottom to admit air beneath the eggs. The ventilator is then packed with sawdust to a depth of 6

in. This leaves a 2-in. space under the egg tray in which to place pans of water for supplying the proper moisture to the eggs. It also provides a ventilated air chamber.

The parts are assembled by placing the egg tray upon the ventilator, and



Details of Incubator

the tank, metal side down, on the egg tray. Vertical strips, O, 11¼ in. long, are nailed to the sides and back end of the ventilator and fitted close together. These support the whole weight of the tank so that the egg tray can slide in and out easily. They also seal up the spaces so that no sawdust can enter the egg tray chamber.

Place a post, M, 2 in. square and 30 in. high, at each corner of the extended ventilator bottom and form a box around these with 1-in. matched lumber. This box will be 6 in. outside of the three inner parts. Make the part around the end of the egg tray X so that the tray can be withdrawn without the sawdust entering the space. The 6-in. space on all sides and on top of the three inner parts is now packed hard with sawdust. Crumpled newspaper is even better, but whatever insulation is used should be packed hard in the open space. Nail six 1-in. pieces, N, on the bottom to allow the air below to circulate freely, and the incubator is ready for use.

The incubator is put into operation by filling the tank with boiling water and closing it tightly, first placing an accurate thermometer in the tray. It takes some little time for the heat to

penetrate through the packing, but when it does, a kettle full of boiling water once a day in moderate weather and a less amount twice a day in cold weather will keep it at a comparatively even temperature of 103 deg.—the proper temperature. It is best to practice with the incubator for three or four days before putting the eggs in, to find how much water is necessary to run it.

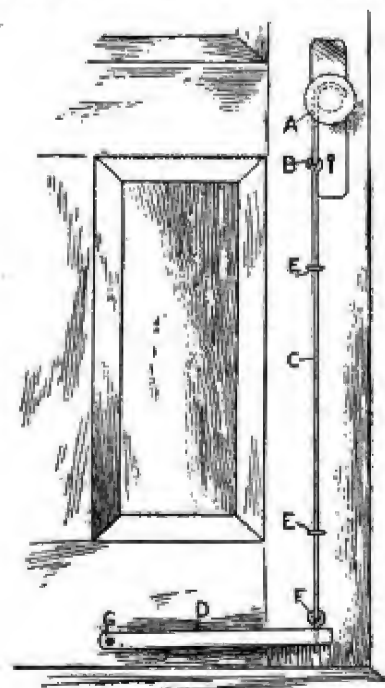
Never try to cool the incubator by putting in cold water; the heat is in the packing and it will take hours either to raise or lower the temperature 2 deg. This is what makes the machine so faithful. Before putting in the eggs, adjust the temperature to 110 deg. and place the thermometer in the center of the egg tray—the bulb on a level with the top of the eggs and the top slightly higher. The eggs will cool the drawer, but if in the course of an hour or two

the temperature has fallen below 100 deg., the addition of more hot water will soon raise it to the proper degree. If the temperature does not fall below 98 deg. or rise above 105 deg. the best results will be obtained, though a temperature of 108 deg. for a short time may do no harm. Always cool by opening the tray. Keep shallow trays of water in the ventilator and change this daily. Keep several moist sponges in the egg tray; if they are found to be dry, it is a sign that the eggs need sprinkling with tepid water. The general care of the eggs (cooling and turning) is the same as in any other incubator.

With a little experience, an operator can obtain as nearly perfect results with this machine as with the most expensive lamp-heated apparatus made.—Contributed by W. E. Morton, Marinette, Wis.

Foot-Operated Door Latch

A simple device for opening a door with the foot is shown in the sketch.



A thin leather strap, A, $\frac{5}{8}$ in. wide, is fastened to the shank of the knob by the holding screw. The strap is then given two turns around the shank and connected at B to the lever with a piece of wire. The wire C is held in place

with two staples, EE. The lower end of the wire is fastened to the foot lever D with a screw-eye, F. The foot lever is pivoted at G with a screw.—Contributed by C. H. Corner, Sedalia, Mo.

Working Aluminum

Aluminum is not worked as often as steel, wrought iron, cast iron or brass, and the average machinist does not know how to machine it. On all cutting except tapping, work the metal dry. Aluminum, like other cast metals, is lifeless; that is, long curling shavings cannot be taken off as with steel, but rather a shower of small chips as in cutting cast brass.

The metal is easily torn, especially in thread-cutting in the lathe, where, if not careful, the tool will dig in and rip out rough threads. In making fine, smooth threads, take several light finishing cuts. For a nice surface finish, either in a lathe or planer, use a broad tool, but with a light cut, and employ the same caution as in thread-cutting to prevent digging and tearing the metal. Aluminum can be cut as fast as brass.

☞ When winding a small rope into a ball, wind it from the bottom out and over the top toward you and the rope will not twist into knots.

Driving Nails in Brick Walls

The accompanying sketch shows a device which was successfully used in a building where a large number of spikes had to be driven into the brick-work.

A piece of hardwood was dressed square and rounded off at one end to form a handle. Holes to receive different sized nails were drilled in a line through the center of the square part. The block was then sawed through so as to cut the holes in half and a large



Nail Holder

strap hinge screwed to the back and bent over the sides. A ring made of a piece of pipe was slipped over the handle to hold the parts together. If necessary, different sizes can be made for use successively as the nail is driven.

—Contributed by L. M. Eifel, Chicago.

A Mixing Stick

The mixing stick shown in the sketch has better stirring qualities than the usual variety, because the V-shape formed by the two flat pieces of wood draws the liquid to one point in the center and forms two spaces behind the stick when it is kept in motion. The liquid flowing through the opening between the sticks comes in contact with that passing around the outside, thus



Double Stirring Stick

causing the unmixed portions to come together from both sides.

The handle part is made from a square block of wood turned on one end for a handhold. Two strips of wood are nailed or screwed to the sides of the square at right angles, allowing a space of $\frac{1}{2}$ in. between them.

—Contributed by F. G. Rempe, Oakland, Cal.

Removing Hot Nuts

In removing nuts from hot engines, hot boxes or other hot parts, the method shown in the illustration is the



Taking Nut on Screwdriver

one I use to hold the nut and keep it from falling into moving machinery. The nut is turned until it is almost off, then a screwdriver, scratch awl or a short piece of rod is placed against the head of the bolt and the nut is then turned off and on to the holding tool.

—Contributed by Herbert H. Van Kerner, Baldwin, Kans.

A Tin Weather Strip for a Hinged Window

The sketch herewith shows a little device to prevent dust and soot from blowing in at the bottom of windows where the sashes are hinged at the top. It is made of tin, about $1\frac{1}{2}$ in. wide,

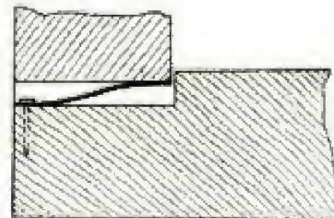


Fig. 1

Strip in the Casing

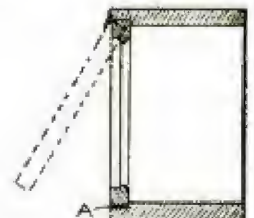


Fig. 2

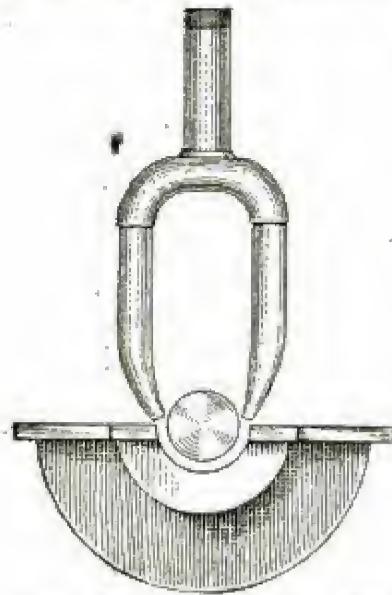
bent in the shape shown in Fig. 1. Then it is nailed to the lower edge of the window sill. When the sash is closed, the tin will fit tightly against the edge, as at A, Fig. 2. If the sides are loose, the tin is used in the same way.

—Contributed by Otto J. Kling, Youngstown, O.

Where an annealed copper gasket fails to make a tight joint, try wrapping the gasket with heavy cord or wicking. Soak the wrapped gasket in valve oil. When the gasket is again inserted you will have a permanent repair.

Babbitting Automobile-Engine Bearings

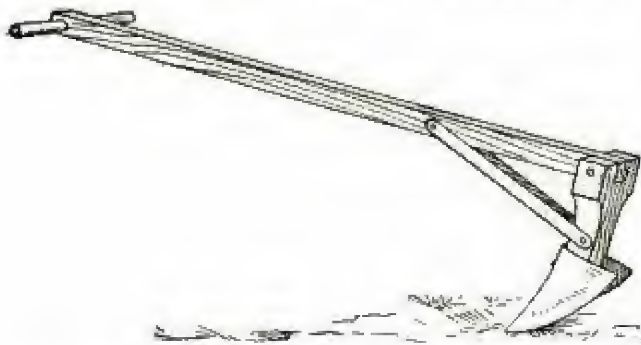
The main bearing on the crankshaft of an automobile engine is not easily accessible for rebabbitting. There is



no way to get to the bearing with a ladle of melted metal without taking the engine apart. I did not care to take the time for this, so I made a device from an old bicycle fork and used it as a gate for the metal. The fork was cut off to make it about 12 in. long and shaped as shown in the sketch. The fork must be heated so that it will not chill the metal. It is then quickly placed over the bearing as shown. The melted metal poured in at the top flows down the fork sides and into the bearing.—Contributed by Chas. Straughan, Sprague, Wash.

A Garden Plow

The hand plow stock shown in the sketch is made preferably of white oak,



Hand Plow

but any kind of hard wood will do. The shovel arm is fastened to the beam with a wood pin or iron bolt. Two braces of iron or wood are bolted, one on each side of and connecting the

beam and shovel arm. Several holes may be bored through the center line of the beam so that the draft of the plow may be regulated.

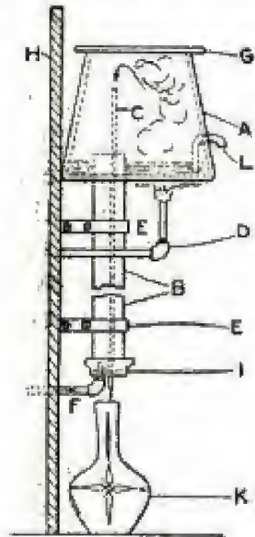
The shovel is fastened to the arm with a bolt. Shovel plows, or solid or winged sweeps may be used. A hole is bored through the front end of the beam and a wood handle inserted.—Contributed by R. A. Bryan, Corsicana, Texas.

Home-Made Water Still

The accompanying illustration shows a still made of pipe and fittings. The receptacle A has a 2-in. pipe, B, 24 in. long, capped on the lower end with its upper end extending into the receptacle about 1½ in. The cap I is drilled and tapped offset for two ¼-in. pipes. The ¼-in. pipe C is 30 in. long, and is threaded on its lower end so that it will extend through the cap I about 2 in.

The ¼-in. pipe F leads to the water supply and should have a valve for regulation. The receptacle A is covered with a metal plate, G. The opening L is for the overflow. The pipe D leading from the gas main is fitted with a burner for heating the receptacle A.

The whole apparatus is fastened to a back board, H, with bands of metal, E E. The water enters the pipe B at the bottom and rises to the receptacle A, where it is converted into steam. The steam is forced downward through the pipe C, where it is condensed by the surrounding cold water, and then drops into the receiving bottle K.—Contributed by R. H. Burdick, San Diego, Cal.



Never loosen nuts on a lathe with a hammer. Always use a wrench and do not set them so tight that it requires a blow to start them.

A Time Regulator for a Furnace

Anyone who lives in a cold climate knows how disagreeable it is to get up in the cold and start the furnace. A time regulator such as the one described in the following makes it possible to have the drafts turned on at any desired hour of the day or night, so that the fires may be banked for the night and yet have the house nice and warm when one is ready to get up.

Secure a piece of strap iron about $1\frac{1}{8}$ in. thick by $\frac{1}{2}$ in. wide, with a length of about 14 in. Bend the top over at right angles so that the arm is about 12 in. long. Drill a hole at the lower end to receive the hook to which the chain is fastened. File a notch in one side, $11\frac{1}{2}$ in. from the bottom as shown. File another similar notch $2\frac{1}{2}$ in. above the first one.

Cut and shape two pieces of strap iron as shown at A, Fig. 1, and drill holes for screws. Shape a buffer, B, from a piece of hard wood and attach a rubber bumper which can be purchased at any hardware store.

Secure an ordinary alarm clock with a good strong spring on the alarm wind. The parts are attached to the back of the clock as shown in Fig. 1. The location of the tripping nail or

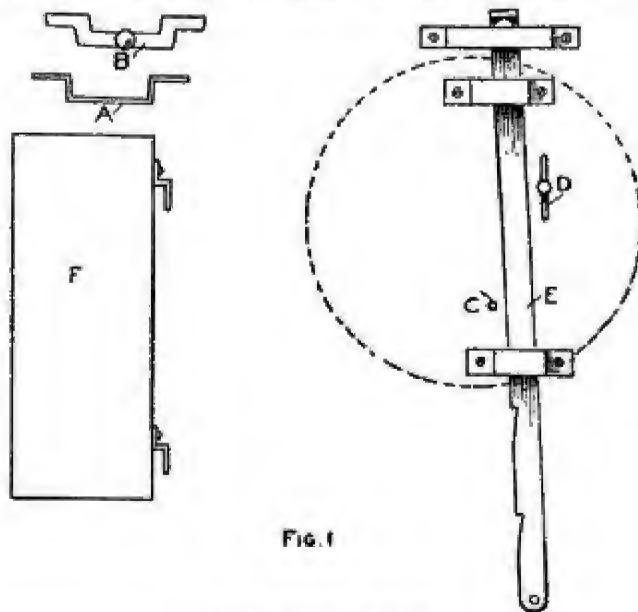


Fig. 1
Clock Attachments

screw, C, is to be determined by trial. It should be about $\frac{3}{4}$ in. above the top of the lower cleat. The alarm wind is

shown by D. When the bar E is set with one of the notches on the lower cleat, it remains in this position until

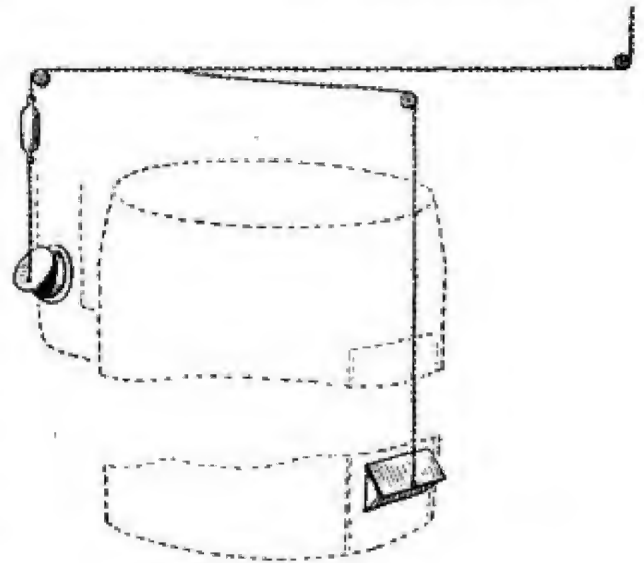


Fig. 2
Chains Attached to Furnace

the key D turns and pries it off by pushing it against the pin C. The dropping of the bar E releases the chains to the drafts of the furnace. Two brackets are soldered or screwed to the back of the clock as shown at F, Fig. 1, after the other parts are in place. These are for holding the clock in place when used on the time regulator and to make it easy to remove the clock. The brackets slip into staples placed in the wall where the attachments are used.

The chains are connected as shown in Fig. 2. When the lever is down, the weight in the basement opens the draft door. When the lever is in its highest position, the check is open; when in the middle position, neither draft nor check is on. In adjusting the chains, the lever should be placed in neutral position and both chains made taut. An ordinary window weight is used and it should be no heavier than is necessary to raise the draft door.

One loose bearing on a machine has a tendency to loosen others, causing knocks, loss of power and the crystallization of metal.

Ice Scraper on a Broom Handle

Packed snow and ice on steps and sidewalks cannot be removed with an ordinary broom, and I made an attach-

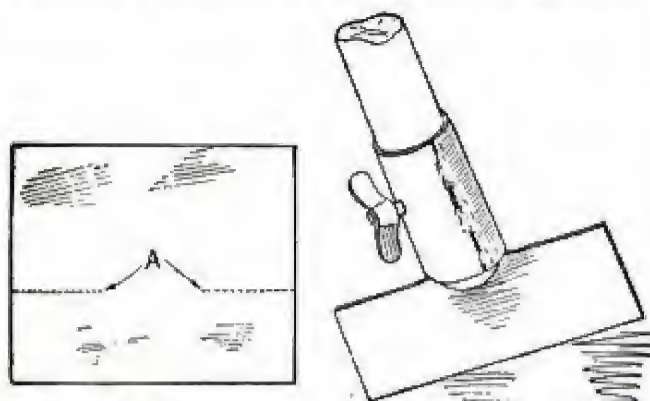


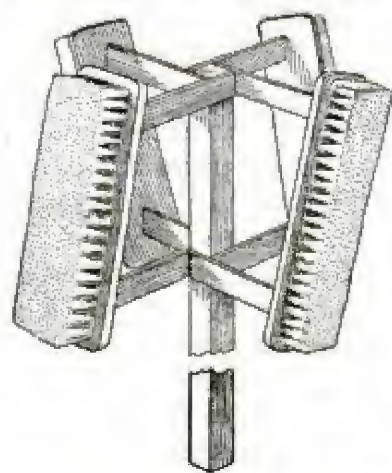
FIG. 1

Scraper on End of Broom Handle

ment for the handle, as shown in the illustration, so that I could have a scraper and broom combined. The scraper is made of a piece of sheet iron cut on the lines A, Fig. 1. The metal above these lines was bent around the handle and fitted with a setscrew, as shown in Fig. 2. When the scraper is not in use, it can be removed.—Contributed by C. C. Brabant, Alpena, Michigan.

Stovepipe and Stack Cleaner

The construction of this device for cleaning stovepipes and stacks will be



readily understood from the sketch. The center piece is $1\frac{1}{4}$ in. square, and on this are nailed eight 3-in. strips, $\frac{1}{4}$ by $\frac{1}{2}$ in. in thickness. These strips are so nailed on the center piece that the brushes when attached are set at a slight angle. For pipes or stacks of large diameter, the strips may be made longer.—Contributed by Maurice Baudier, New Orleans, La.

Cutting Threads with a File

Having to repair some farm machinery about 10 miles from a machine shop, we had to shorten a 1-in. bolt about 4 in. This meant cutting off the threaded part and making new threads on the smooth shank of the bolt. The only tools at our command were a vise and some files. The problem was solved in the following manner:

A piece of paper, about $1\frac{1}{2}$ in. wide, was cut so that the edges would meet when it was wrapped around the bolt. Eight threads per inch being the standard for a 1-in. bolt, the paper was laid out in eighths, as shown in Fig. 1. It was then pasted around the bolt, as in Fig. 2, the thread being correctly indicated by slipping one edge of the strip forward one division.

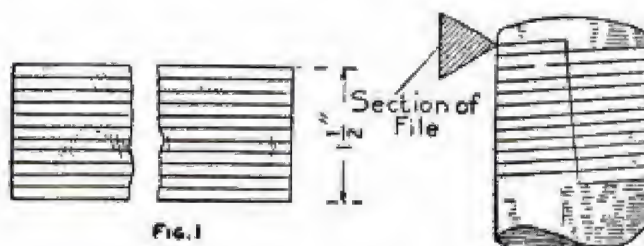


FIG. 1

FIG. 2

Marking the Threads

The threaded end of the bolt having previously been cut off, the new threads were cut by following the lines on the paper with a three-cornered file. The depth of the threads was tested by following the file with the nut as the threads were cut.

The thread thus made was not comparable with one made by the dies, but it was good enough to answer the purpose.—Contributed by Arthur D. Johnson, Philadelphia, Pa.

Self-Heating Soldering Iron

A soldering iron that carries its own heating device on the handle, shown in the sketch, is useful for the trouble man, as it can be made small enough to be carried in the pocket, also it is a useful household tool.

No dimensions are given as the size may be determined by the conditions.

The only caution is not to place the pan too far from the copper. The copper can be used from an old soldering-iron or one of the proper size may be purchased. A small rod is threaded on both ends, one end having sufficient length of threads to hold the copper and also a small pan. The pan is made of a cover from a baking powder tin which is filled with asbestos and covered with wire gauze, then placed on the rod back of the copper and fastened in place with a nut on each side.

The handle part may be made of wood, but to have the whole iron self-contained, it should be made of a small screw-top can for holding the fuel fluid. A can such as used for holding metal polish makes a good container. A hole is cut in the screw top to admit the threaded end of the small rod and is held in place with two nuts between which a leather washer is placed to prevent any leaks.

The copper is heated by placing a small quantity of the heating fluid—preferably denatured alcohol—in the pan and lighting it while the whole device stands in an upright position. A sufficient quantity of alcohol burned



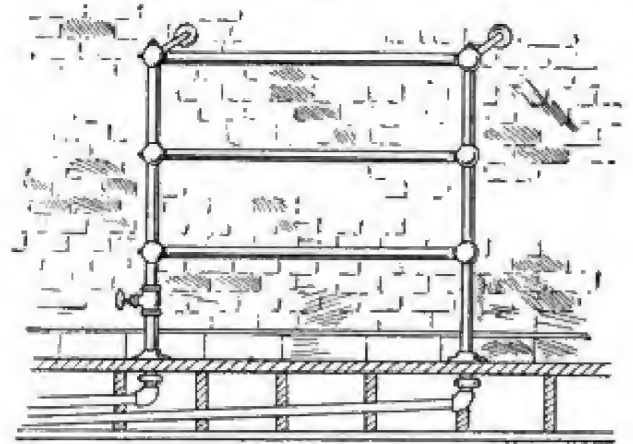
Heating Attachment

in the pan will heat the copper.—Contributed by Clarence A. Anderson, Halifax, N. S.

Heated Towel Rails

A fixture of considerable utility in the bathroom, and one that can be made to have an exceedingly attractive appearance, is the heated towel rail; yet it is one that has been almost entirely overlooked by plumbers, says the Metal Worker. The ordinary bent tube as a convenience for hanging towels upon is good enough, but the comfort and convenience of always having warm and dry towels in the bathroom are obvious.

The illustration shows a rail made of nickel-plated brass tube, $1\frac{1}{4}$ or $1\frac{1}{2}$ in. in diameter. The tees are of an ornamental design and the wall and floor



Rails Connected to Steam Main

flange connections are provided for flow and return pipes. The connection to these are in the floor. The method of connecting a towel rail is identical with that of connecting a radiator, and there is no trouble at all in heating it, if the position is such that a circulation is possible.

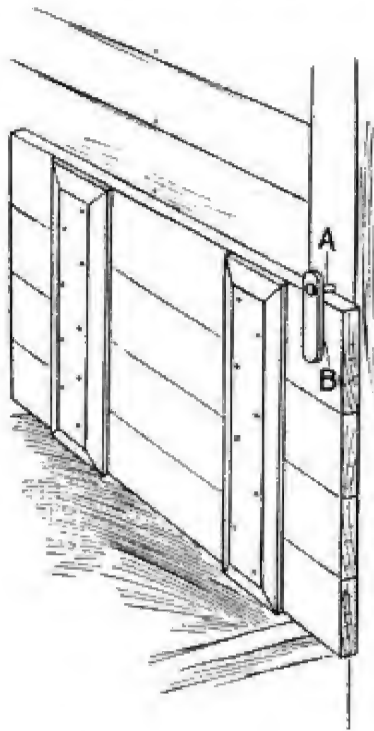
Milling in a Lathe

In an emergency, the lathe can be used as a milling machine on surface planing. Mount an arbor between centers on which cutters are placed and the lathe is converted into a milling machine for light work. The manner of holding the piece to be worked depends on its shape. Sometimes a vise can be bolted to the cross slide and the work clamped in it, and sometimes work can be bolted to the cross slide by means of the tool-post slot. The feed is taken by the cross-feed screw.

A limited class of work can be bolted to the lathe parallels. This method is suitable for work requiring not a cross feed, but a feed up and down, which is obtained by means of the rise-and-fall carriage of the lathe when the latter is so constructed. Keyways of considerable length have been milled in the lathe by feeding the full length of the cross screw and then resetting the work. Very good work can be accomplished rapidly with a little practice.

Clip for Holding a Trapdoor Open

A clip used in the place of a hook for holding a trapdoor open is shown

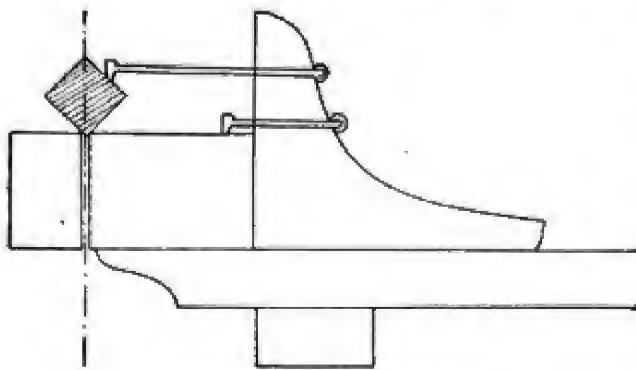


at A in the sketch. It consists of a piece of strap iron, B, nailed or screwed to the wall or support. The screw or nail is set in just far enough to allow a space for the width of the door and the thickness of the strap iron. This device is much better than a hook

as it will not shake loose if the door is disturbed by the wind or given a jar from a bump of a box or other article.—Contributed by E. A. Rauchschwalbe, Milwaukee, Wis.

Cutting Three-Cornered Pieces in a Sawmill

An order came into our sawmill for a large number of timbers to be sawed with three faces. Such a large num-



Holding Pieces to be Sawed

ber of pieces to be cut in an ordinary sawmill presented quite a problem. The sketch shows a clever way we

used to get the work out. The view is in section and the dotted center line is the position of the saw. The ends of the large timbers on the carriage were held with double-ended dogs. Care must be taken not to run the carriage back too far as the dog in the end of the timbers is in the path of the saw.—Contributed by J. W. Bauholster, Gresham, Ore.

An Old Piston Used as a Pattern

It was necessary to have our gas-engine cylinder rebored and a new piston made to fit the enlarged diameter. As it would have taken considerable time to procure a new piston casting from the manufacturers, and not wishing to pay the price of a pattern, we decided to use the old piston as a pattern. This was done as follows:

The ring grooves were filled in with wood, which was driven in tight and smoothed off flush with the outside of the piston.

Three layers of thick rubber packing were used to increase the diameter and

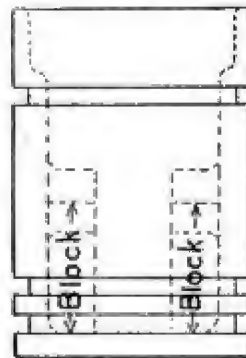


Fig. 1

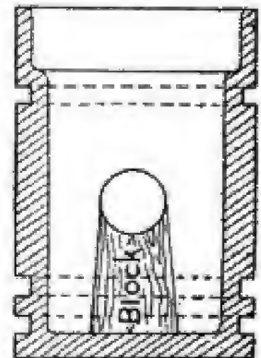


Fig. 2

Old Casting Used for a Pattern

allow material for finishing. The packing was put on with shellac, and twine was wound around the outer layer to hold it in place while drying.

Under each of the connecting-rod-pin bosses, a block of wood was fitted as shown in the sketch. This made it possible for the molder to "lift" or "cope" out the inside of the piston and fill in the voids left by the blocks, using a loose boss to "make up" any deficiencies.—Contributed by Joseph A. Shelly, Brooklyn, N. Y.

A Method of Handling Liquid Manure

One of the hardest and most disagreeable chores on a dairy farm is handling the manure, from the cleaning of the barn to the final disposal of it on the land. How to lessen this labor, is a problem to which many dairymen have given considerable thought, as well as to save all or most of the fertilizer. A plan which proved successful to a correspondent of *Hoard's Dairyman* is given as follows:

We first dug a cistern outside of the barn where all the gutters would open directly into it. The cistern was made 16 ft. deep, 11 ft. wide and 30 ft. long, and is used for 30 cows winter and summer. If we were to make any change we would make it larger, as the longer the manure remains in it, the more liquid it becomes and the easier it is to handle. This size would be ample if cows were not stabled in the summer, and works very well as it is, but we would recommend 30 cu. ft. per cow each month the cows are stabled during the year.

Into this pit all manure, both solid and liquid, is pushed with a shovel, care being taken to keep the hay and bedding out of the gutters as much as possible. If the gutters have a slope toward the pit, it will be some advantage.

We used a 2-in. centrifugal pump to which was attached a 3-in. inlet pipe and a 2½-in. outlet. Such a pump will pump anything resembling liquid. This will pump a load in 2 or 3 minutes. A 2½ or 3-in. size is preferable, as it is not so likely to clog with the hay and trash that are so liable to get into the cistern.

The inlet pipe extends almost to the bottom of the pit and is fitted on that end with a plain sliding gate valve operated by a rod which extends up

where it can be lifted with the hand. When the pump is in motion, the gate can be raised and the pump will operate. The gate must be closed before the pump is stopped or the pump will lose its priming.

The inlet pipe is placed inside a curb

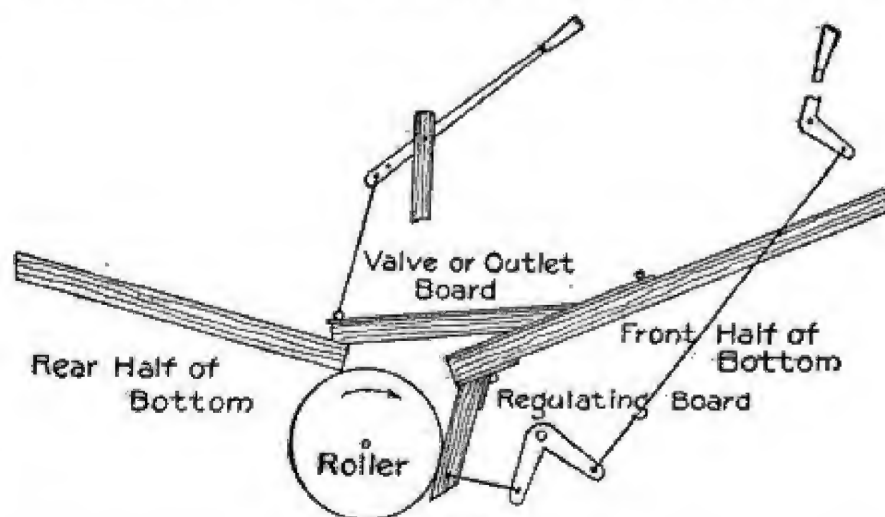


Diagram of Spreader

3 ft. square made of boards 1 ft. wide and 16 ft. long. A piece of heavy galvanized sheet iron perforated with 1-in. holes 4 in. apart each way is used on one or more of the sides in place of a board. This arrangement is to keep back the hay and trash and let the manure through. It is necessary to use a long-handled rake on the outside of this screen to keep it clean and draw out the hay. It is convenient to have a tight-and-loose pulley arrangement on the pump so that the latter may be started and stopped without stopping the engine.

Water should be supplied to the cistern when the manure gets too thick to pump. The water should be applied where the rake is used. The longer the manure remains in the cistern the more liquid it becomes, so that if the pit is large enough, but very little water will be needed. It is not necessary or desirable ever to empty the pit or lower it more than enough to insure plenty of room at all times.

A tank for spreading the manure is made of lumber and put on a wagon. The bottom of this tank slopes from

each end to the middle with a pitch of 1 ft. in 4 ft., so the liquid will all flow to the outlet going either up hill or down. The front and rear portions of the bottom lack about 4 in. of meeting in the middle, so there is an opening 4 in. wide extending across the whole width of the bottom, over which is hinged a board that can be raised with a lever from above. When this board is down, no liquid will flow out.

A 6-in. roller is placed under the rear edge of this opening with its top touching the bottom board. A board is

hinged to the under side of the front edge which swings up against the front of the roller and is controlled by a lever to regulate the flow of the manure as desired. When the valve or outlet board is raised, the manure flows in the V-shaped space between the regulating board and the roller. The roller is made to revolve forward by a chain from a sprocket wheel on the rear wheel of the wagon, and by so doing keeps the space between itself and the regulating board clear, and the liquid will flow out in a solid sheet.

A Cistern Strainer

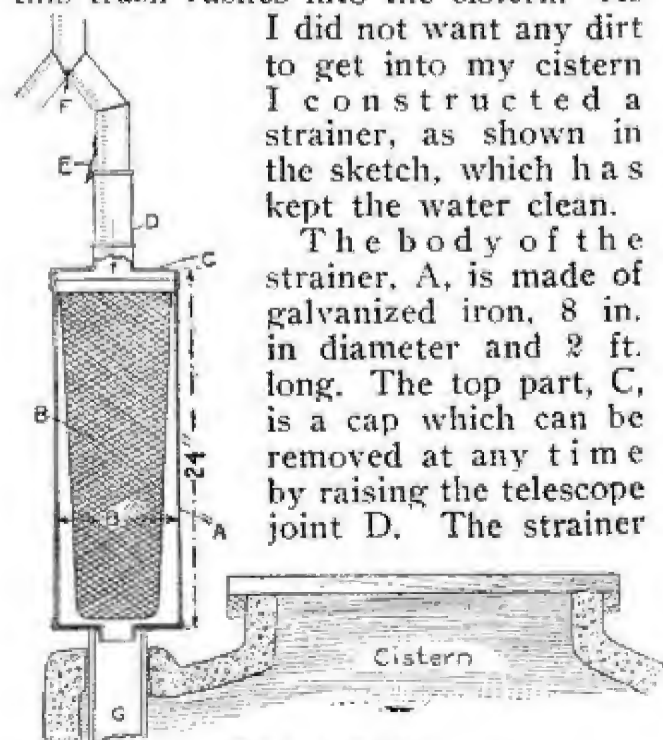
The first dash from a shower on the roof of a house carries with it all dirt, soot, leaves and branches. If the cut-out valve in the pipe is forgotten all this trash rushes into the cistern. As

I did not want any dirt to get into my cistern I constructed a strainer, as shown in the sketch, which has kept the water clean.

The body of the strainer, A, is made of galvanized iron, 8 in. in diameter and 2 ft. long. The top part, C, is a cap which can be removed at any time by raising the telescope joint D. The strainer

important as the new water stirs up the old, and, if there is any overflow, most of the old water is forced out. If the cistern is made of concrete, the pipe G can be fastened into the top of the cistern.

A finer screen can be placed inside of the coarse screen B to hold finer particles of dirt. Most of the sediment which comes from soot and dirt blown on the roof will be found in the bottom part of the screen when it is taken out for cleaning.—Contributed by F. E. Dougan, Pawnee, Okla.



Filter on Cistern

part B is made of a fine quality of screen wire having about $\frac{1}{4}$ -in. mesh. The screen is made tapering with an iron band at the top to hold it in place. A band of iron is riveted to the shell A to make a shoulder on which to set the band in the screen.

The outlet from the strainer and inlet to the cistern, G, is a pipe that is as long as the cistern is deep. This is

Painting the Bathtub

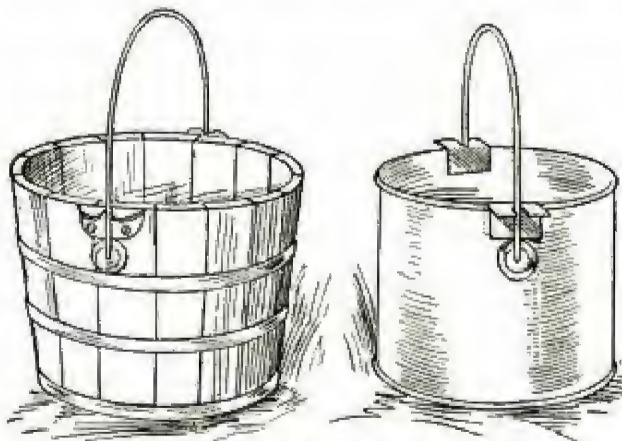
A very essential thing in painting a bathtub is to first clean it thoroughly. All old paint, if there is any, must be removed, and the surface sandpapered smooth. It may be necessary to use strong sal-soda water to get it right. When clean and perfectly dry, give it a coat of white lead in oil, mixed with equal parts of gold size and turpentine. Two or three coats should be given, says the Master Painter, allowing two days between each coat for drying. Lightly sandpaper each coat of paint. Now apply one or two coats of bathtub enamel, sold at the paint stores. Let this stand several days to dry. After this, a coat of enamel paint once or twice a year will keep the tub in fine appearance.

Labeling Barrels

Drug stores, oil cellars, chemical houses and liquor stores have many barrels and kegs from which the contents are taken from time to time and put into bottles. These barrels must be marked in some manner to identify each particular substance contained within. The ordinary way is to paste a label on each barrel as often as another is wanted. A much better way is to have an extra hoop securely labeled and which can be slipped easily over the top of the barrel.—Contributed by Jacob Zeithlin, New York, N. Y.

Bail Holders for Buckets and Pails

The devices shown in the accompanying sketch are made from small pieces of sheet iron and attached to the edge of the pail to hold the bail in



Bail Holder Attached

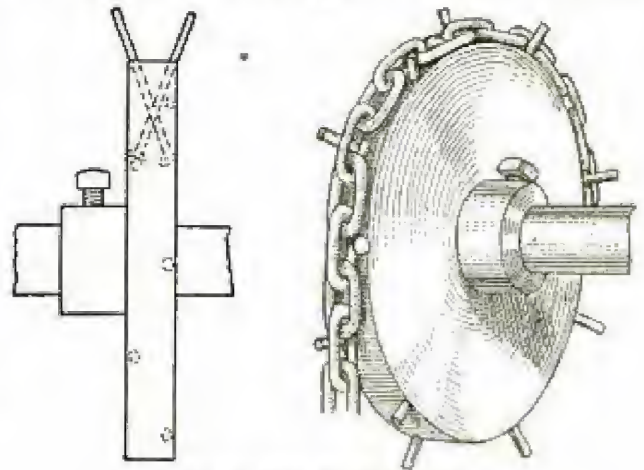
an upright position. The metal clip is fastened with screws to wooden buckets and clamped over the edge on tin pails. These clips are very handy for paint, glue and paste pails, to keep the handle clean.—Contributed by W. A. Jaquythe, Richmond, Cal.

A Temporary Chain Sprocket

The chain sprocket on an overhead traveling crane in a small foundry was so badly broken it could not be repaired. The sprocket was replaced in a quick and novel way as follows:

A pattern similar to a flange coup-

ling was used and spaced on its circumference by wrapping a tape measure on the face. These spaces were marked



Nails Used as Sprockets

on the mold before the pattern was drawn from the sand. Nails were placed in the sand on the marked divisions. The hole for the shaft was made $\frac{1}{8}$ in. larger than necessary so there was no machine work except to drill and tap the boss for a setscrew. This emergency repair was used until a better sprocket could be made.—Contributed by M. E. Duggan, Kenosha, Wisconsin.

A Double-Bladed Offset Screwdriver

An ordinary offset screwdriver is a handy tool in an unhandy place, but in such a place it is usually awkward to shift the screwdriver end for end after turning the screw each quarter turn. Recently I saw a double-bladed screwdriver which was an improved type of the offset kind. The advantages of this screwdriver is that to change grips it is only necessary to turn it over in the



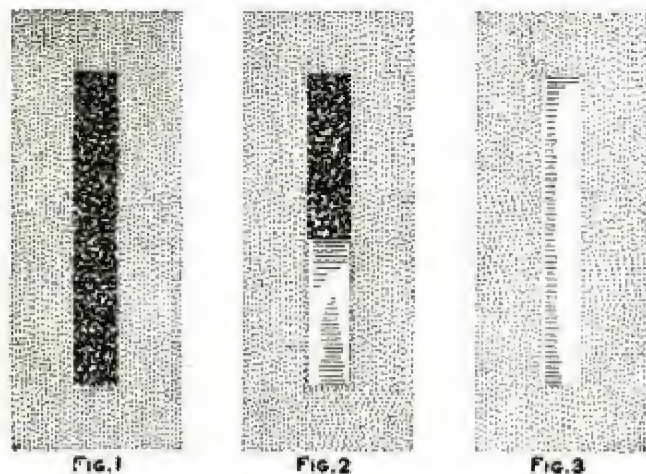
Offset Screwdriver

hand, thus bringing the other blade into use.

The screwdriver is easily made by upsetting the end of a steel rod and filing the blades into shape as shown in the sketch, then hardening and tempering to a deep blue.—Contributed by Chester L. Lucas, E. Saugus, Mass.

Boiler Water Level Determined by Gauge-Glass Shadows

Under certain conditions it is impossible to tell by examination of the water glass whether a steam boiler is

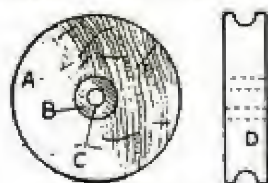


Shadows from the Glass

full or empty, particularly if the glass is dirty, as it has the same appearance for its entire length. The trycocks will, of course, show the condition, but there is another way: The shadow cast on the boiler by an empty glass will be similar to Fig. 1, a dark line; but with one partly full, as in Fig. 2, or a full water gauge, a luminous stripe, as in Fig. 3, will appear. The full tube concentrates the light like a condensing lens, while the empty tube absorbs part of the light and therefore casts a shadow. These conditions are best noticed at night when a single light always hangs in front of the boiler.—Contributed by James M. Kane, Doylestown, Pa.

Pulleys for Aeroplane Construction

If no lathe is at hand, a good way to make pulleys for aeroplane construction is as follows:



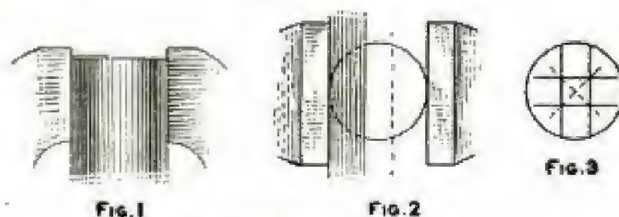
Take a piece of round hardwood (a fork or broom handle will do), and cut as many blocks (A) $\frac{1}{4}$ in. thick as

is necessary for the number of pulleys. Bore a $\frac{3}{8}$ -in. hole in the center of each block. Fill the hole with babbitt metal, B, and drill a hole, C, through the metal

to admit a pin for a bearing. Cut a groove for the rope in the circumference, as shown at D. The bearing support may be constructed of sheet metal to suit the place where the pulley is located.

Quick Practical Method of Centering

In general machine shop practice a quick way of centering a bar for turning purposes is always very desirable. This can be readily accomplished accurately without the use of tools; that is, dividers or center square, in the following manner: Place the bar to be centered, which may be round, square or hexagonal, in a vise, allowing the face of the end of the bar to set about $\frac{1}{8}$ in. below the top surface of the vise jaws, as shown in Fig. 1. Then place a rule, scale or any flat piece of metal of about one-half the diameter of the bar to be centered along the front jaw of the vise and scribe a line across the



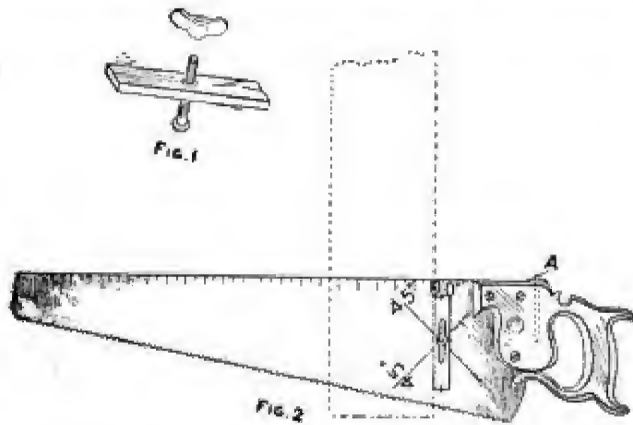
Holding Shaft in a Vise

end surface of the bar. Then shift the scale or rule to the back jaw of the vise and scribe a second line across the end surface of the bar. This gives two lines close together and parallel. Turn the bar about one-half turn and fasten it in the jaws of the vise in the same manner as before, then draw a line across the end surface of the bar with the rule or scale resting on the front jaw and on the back jaw of the vise, as shown in Fig. 2. This will give two parallel lines crossing the first two at the center, as shown in Fig. 3. The small square formed by the four lines intersecting is exactly in the center of the bar. The center may be easily determined by the eye or two cross lines as shown by the dotted lines.—Contributed by Angel Afanador, Indianapolis, Ind.

Combination Square and Handsaw

The sketch shows how to make a handsaw serve the purpose of a square, a scratch-awl holder and a rule. Another addition of a square and protractor can be attached by drilling a small hole in the saw blade close to the handle and inserting a machine screw to hold a piece of metal having its sides planed smooth. A thumbnut is used on the bolt for convenience. These parts are shown in Fig. 1.

Place the saw on a board with the smooth surface of the metal guide against the edge of the board and mark on the saw positions for the attachments such as 45 and 90 deg., as shown



Square and Rule on a Saw

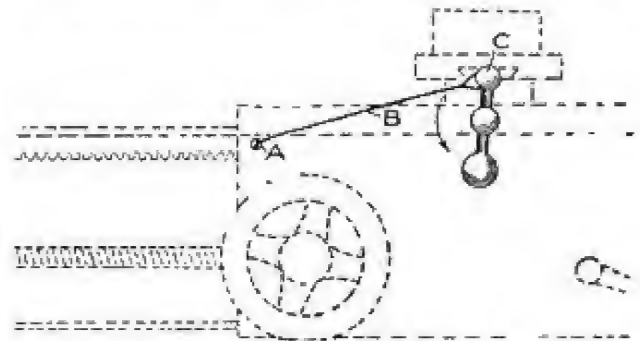
in Fig. 2, using a square or protractor to get them accurate. The straight-edge of the saw is marked the same as a square.

A hole is drilled in the handle at A for the scratcher. The scratcher must fit snugly in the handle to keep it in place. It may be necessary to use a red-hot wire in making the hole, for the purpose of getting it small enough. —Contributed by A. P. Connor, Washington, D. C.

An Aid to Cutting Threads in a Lathe

A small hole is drilled and tapped for a screw, at A, in the apron of the lathe. One end of a chain, B, is fastened to the screw A and looped at the other end to slip over the handle C. The length of the chain from A to C must be just long enough to allow the

crank to be rotated a little more than a half turn. The swing of the handle being limited, the feed will be always

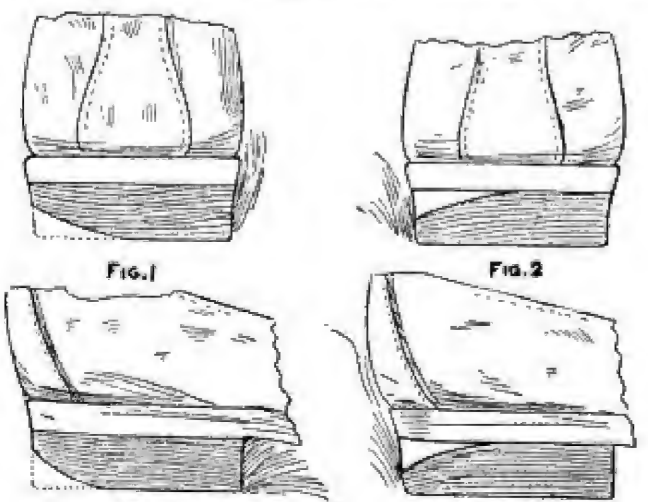


Gauging Depth of Cuts

the same. The handle is at the top in the position shown, when the tool is cutting; it is turned around to the bottom position for backing up to take another cut. The additional depth of cut is obtained with the compound screw feed, which is set anywhere inside of an angle of 30 deg. either side of straight across. —Contributed by C. R. Poole, Los Angeles, Cal.

Repairing Rubber Shoe Heels

If a rubber heel is worn as shown in Fig. 1, cut a leather wedge the shape of the worn place and put it between the shoe and the rubber heel, as shown in Fig. 2. In Fig. 3 is shown the wear



Showing How Wedge is Applied

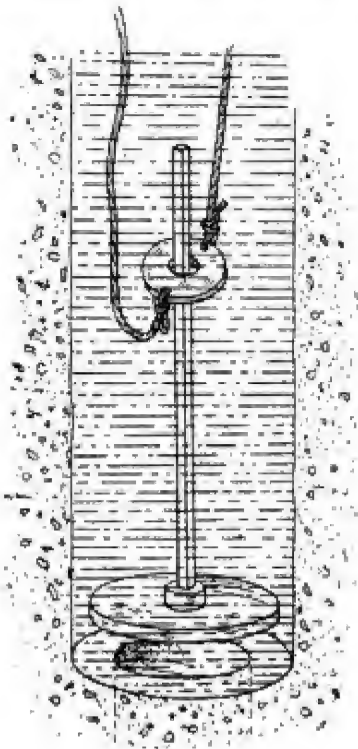
on the rear part of the heel, and in Fig. 4, the method of applying the wedge. —Contributed by Walter W. White, Denver, Colo.

Lifting a Gate Covering from a Penstock

The lifting of the gate covering as shown in the sketch not only applies

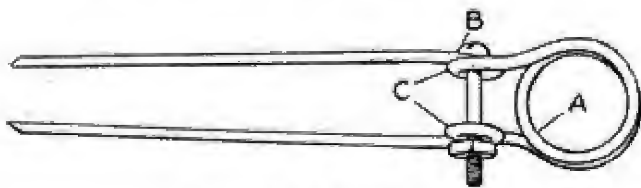
to this one article, but the method may also be used on similar articles in similar places. The lifting device consists of a large washer with teeth filed on the inner edges of the hole and the ends of a rope attached to each side as shown.

When the washer is held level it can easily be dropped over the article sought, then by slacking on one rope, the disk will tip and the teeth on its inside circumference will engage the article which can then easily be drawn up.



Home-Made Compasses

When an ordinary compass is not at hand a very good substitute can be made of a piece of wire, as shown in the sketch. The wire is given a two-turn coil, A, and then each end is given a



Compass Made of Wire

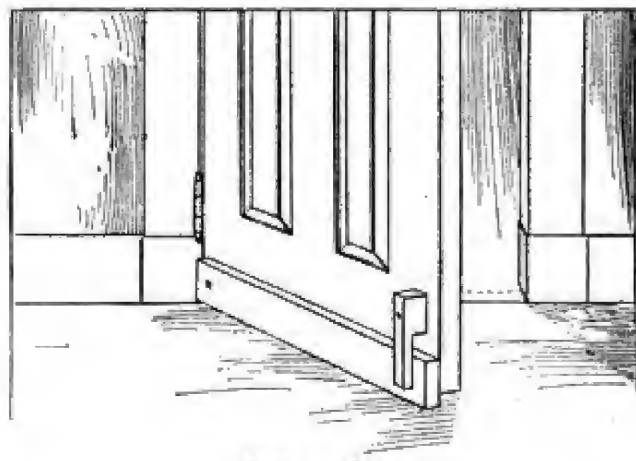
coil, C, to form a loop around the stove bolt, B. The two extending ends are pointed.—Contributed by Geo. Madsen, Chicago.

Preparing Calcimined Ceilings for Wallpaper

A size made of vinegar with a little paste added to give body and make it easy to apply kills the lime in the calcimine. The component parts of this size are things found in every household, and when the solution is applied to the calcimined surface, it dries quickly.—Contributed by Thos. F. Williams, New Bethlehem, Pa.

Automatic Weather Strip for a Door

The floors of an old house I used for a residence were not very level, especially in the hall. The inside partition had settled, making the floor in the hall so much out of level that the outside front door and also the inside vestibule door did not fit close to the floor. There was an open space of about 2 in. on one side when the door was shut. Mats or pieces of carpet were kept against the door to keep out the cold air. When the door was opened, the mats would



Strip on Door

cause trouble. I devised an automatic weather strip, as shown in the sketch, to take the place of the mats.

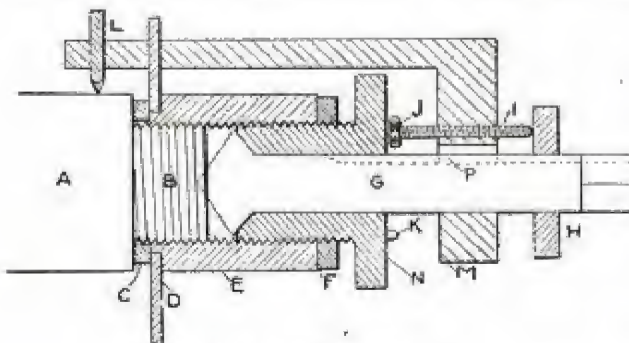
The strip was made of a piece of wood $\frac{3}{4}$ in. thick and 3 in. wide, with a length equal to the width of the door. One end was fastened to the door with a screw on the side near the high part of the floor, in this case the hinged side of the door. A piece of wood was cut out and fastened to the opposite side to act as a keeper for the strip of wood.

A piece of cloth was wrapped around the stick to make it close fitting and to lessen the noise when opening and closing the door. The movable strip would slip over the uneven floor and close the opening when the door was shut.—Contributed by R. Jocelyn, Toronto, Can.

Crankpin Truing Tool

The sketch shows a device for truing a crankpin without removing it from its place. The device is temporarily fastened to the crankpin A by turning it on the threaded end B. The washer C on the end of the socket E provides a groove for the metal piece D that holds the end of the cutter bar to prevent chattering. The main shaft G revolves in a bearing, N, which is screwed into the sleeve E.

The lock nut F sets the bearing N so the conical point on G will turn freely in the center of the crankpin A. The arm M is keyed loosely, at P, to the shaft G so that it will slide laterally. The feed is driven by a screw, I, having a six-winged knocker, J, which strikes on the pin K each revolution of the shaft. The collar H is shrunk tightly on the main shaft. The cutting



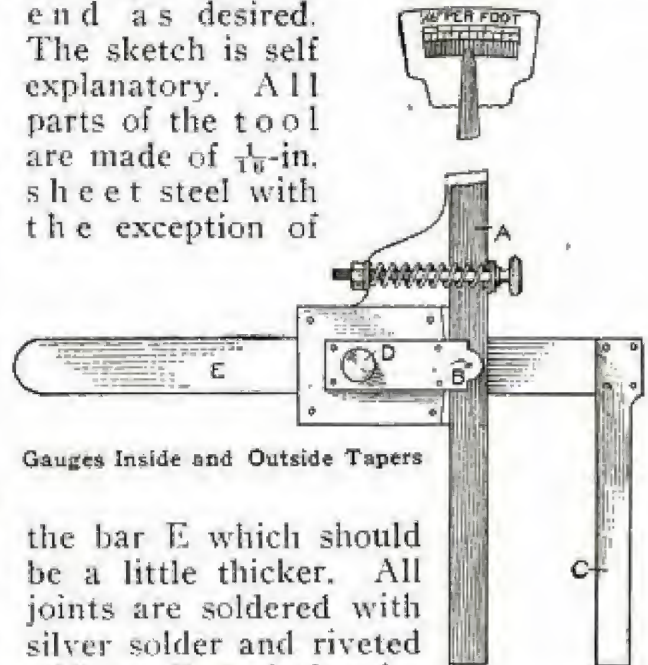
Details of Truing Tool

tool L is fastened into the end of the arm M with a setscrew. The shaft M may be turned with a flexible shaft or by hand with a crank. The method of truing the pin is obvious.—Contributed by Oliver S. Sprout, Harrisburg, Pa.

When lettering on a dark ground, add some aluminum bronze to a white or light paint.

A Taper Gauge

The tool shown in the sketch is one with which the user can ascertain immediately and accurately the taper of a hole, plug, keyway or the like, from the large or small end as desired. The sketch is self explanatory. All parts of the tool are made of $\frac{1}{8}$ -in. sheet steel with the exception of



Gauges Inside and Outside Tapers

the bar E which should be a little thicker. All joints are soldered with silver solder and riveted with small steel pins, for rigidity.

The measurements of the length of the pointer arm A from the swivel pin B to the pointer tip at the graduations should be exactly 6 in., and the graduations should be laid off very carefully to $\frac{1}{32}$ in. and engraved on the dial with a jeweler's small engraving tool. These measurements then give a direct reading of tapers in sixteenths of an inch per foot.

In selecting the zero or central point in the graduations, the blades A and C should be set perfectly parallel to each other, and the edges on both sides of each blade parallel, thus making the one reading dial correct for both inside and outside measurements when the pointer is set at zero. The tool may be used as a caliper square if so desired.

The swivel pin B passes through only the plate D and the pointer, and should be a very neat fit, as is also the case with the sliding head on the bar E. The neatness of these fits and the graduating of the dial are essential to the accuracy of the tool.—Contributed by L. S. Bunker, Vallejo, Cal.

Gas Engine Muffler Made of Funnel

A gas-engine muffler that will give good results and not materially affect the power of the engine is described

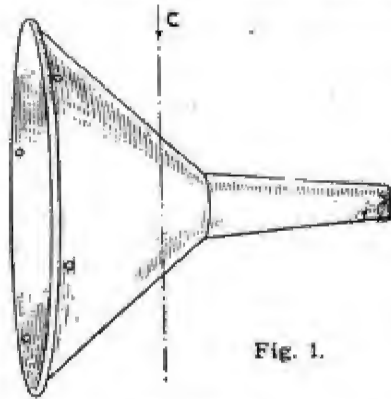


Fig. 1.

by a correspondent of the Automobile Dealer and Repairer. It is made from a number of funnels and a piece of 6-in. stove-

pipe. Procure funnels that are the right size at the large end and cut each one off on the line C, Fig. 1, or about the size of the opening in the exhaust pipe. Slip these cut-off funnels into the stovepipe B, Fig. 2, and fasten the bell ends with small stove bolts in about four places around the pipe.

In placing the funnels, they should be in such shape that the small end of any one comes in exact line with the opening of the next one, as shown by the dotted line C. Place the funnels in this manner until the entire length of pipe is taken up. The ends are made of floor plates threaded to receive the exhaust pipe from the engine. Turn the flange to fit into the end of the pipe as shown at A. Tap this to receive a number of machine screws to hold it in place.

In the exhaust end place the same kind of a plate and screw a short nipple into the threads. The funnels should be placed so that the holes at

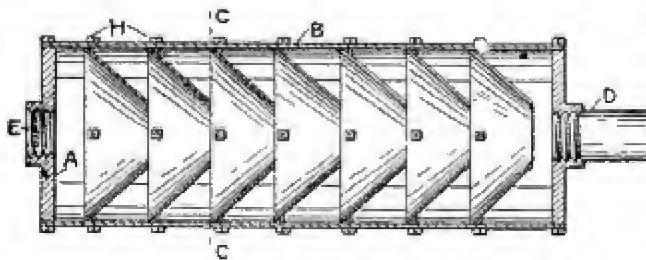


Fig. 2.—Funnels in Place

the small ends will be in direct line. This gives a straight line for the exhaust gases to escape and still deaden

the noise satisfactorily without the danger of the muffler becoming stopped up as sometimes happens with other kinds of silencers.

Many authorities claim that the muffler greatly lessens the effective power of the engine, but in making a brake test with a muffler made after the method described there will be found to be no appreciable change in power.

Metal Removed between the Teeth of a Crosscut Saw

An old crosscut saw having the teeth worn so that the spaces between them have entirely disappeared, can be made as good as new by drilling $\frac{1}{4}$ -in. holes at the depth desired for the spaces, as shown by the dotted lines A, and cut-



Notches Cut Between Teeth

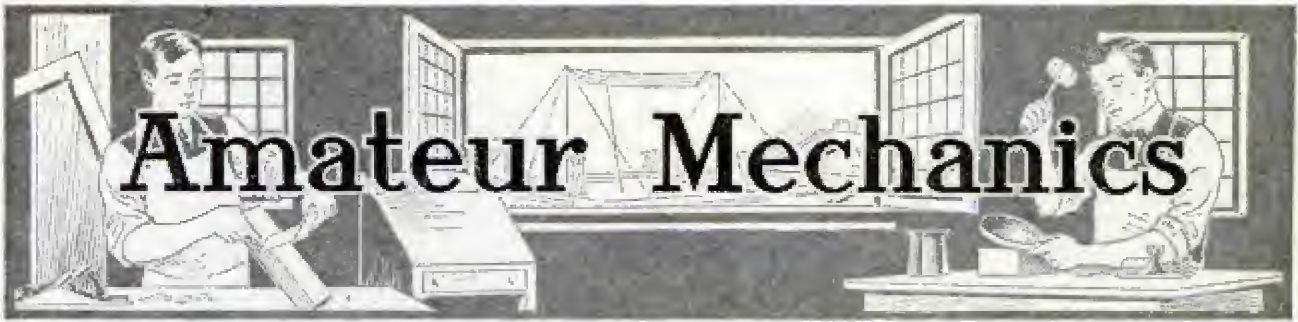
ting out the metal with a cold chisel. The finished openings between the teeth are shown at B.—Contributed by F. M. Warren, Central City, S. Dak.

Home-Made Tobacco Moistener

The man who smokes a pipe and has a hard time to keep his tobacco moist, can do so by placing a small piece of apple with the tobacco in the box. This will not only keep the tobacco moist, but will also add a flavor that is relished by many.

In a tobacco jar the apple may take the place of a sponge. It should be renewed occasionally and must not be allowed to become rotten.—Contributed by J. F. Campbell, W. Somerville, Mass.

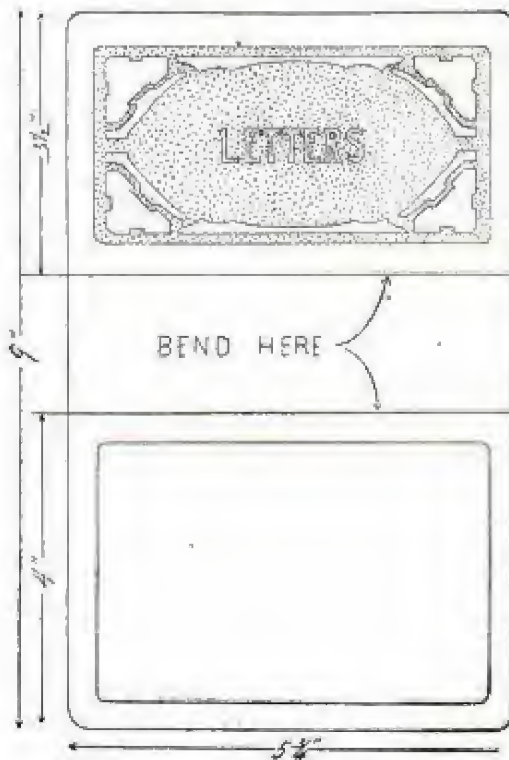
⚠ Never rebabbitt a crank box without liberal liners in it to take up the wear.



A Letter Holder of Pierced Metal

The letter holder shown in the illustration will be found convenient for holding out-going letters that await the postman's coming. It can be made of either copper or brass and need not be of very heavy material. Gauge 22 will be sufficiently heavy. One sheet of metal, 6 by 9½ in., a board on which to work it, and an awl and hammer, will be needed.

Prepare a design for the front. If one such as is shown is to be used, make one-quarter of it first, and then get the other parts by folding on the center lines and tracing. This will insure having all parts alike. The letters can be put on afterward.



Layout for the Metal

Fasten the metal to the board, using tacks and nailing outside of the required

space, in the waste metal. Trace the design on the metal with carbon paper;



Finished Letter Holder

or, if desired, paste the paper design right on the metal. With an awl pierce the metal between the marginal line and the design, as shown. The holes should be uniform along the outlines but should be pierced promiscuously otherwise. On the back, only the marginal line is to be pierced.

Remove the metal, together with the paper if the latter was pasted to the metal, and trim off the surplus metal where the tacks had been placed. File off any sharpness so that the hand may not be injured in handling it. Place the metal on the edge of a table or between two boards, and bend on the two lines indicated in the drawing, to right angles.

A good finish is obtained by just letting the copper age with its natural color. If any polishing is required, it should be done before the metal is fastened to the board and pierced.

CA detail drawing made of a piece of furniture before starting the work will often save time and mistakes.

An Electric Engine

The parts of this engine are supported on a base $\frac{3}{4}$ in. thick, 4 in. wide and 7 in. long. The upright B, Fig. 1,

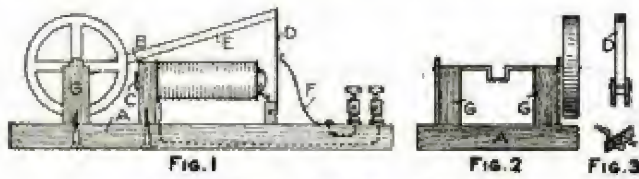


Fig. 1
Shaft Turned by Magnetism

which is $\frac{1}{2}$ in. thick and 3 in. high, is secured across the base about one-third of the distance from one end and fastened with a wood screw put through from the under side. The magnet core C is made of a carriage bolt, $2\frac{1}{2}$ in. long, which is fastened in a hole in the top part of the upright B so that the end C will protrude slightly. Before placing the bolt in the hole of the upright, slip on two cardboard washers, each 1 in. in diameter, one at the head end and the other against the upright B. Wrap a thin piece of paper around the bolt between the washers and wind the space full of No. 22-gauge magnet wire, allowing each end to project for connections.

The driving arm D, Figs. 1 and 3, is made of a piece of soft sheet iron, $\frac{1}{2}$ in. wide and 3 in. long. A small block is fastened to the lower end of the metal and pivoted between two uprights, $\frac{1}{2}$ in. high, which are fastened to the base. The uprights on each side of the block are better shown in Fig. 3.

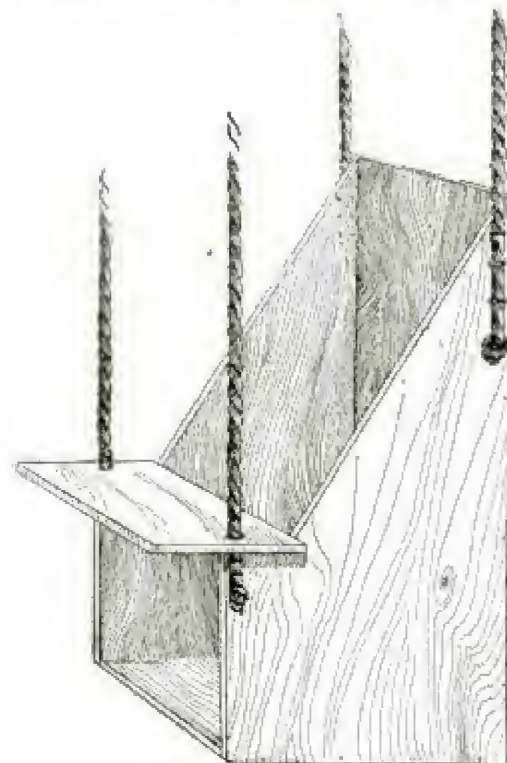
Two supports, each $\frac{1}{2}$ in. thick and 3 in. high, are fastened with screws about half way between the end of the base and the upright B, Fig. 1. The end view of these supports is shown in Fig. 2, at GG. A $\frac{1}{8}$ -in. hole is bored through the top part of each support so they will be in a line for the axle. The axle is made of a piece of steel $\frac{1}{8}$ in. in diameter and about 4 in. long. An offset is bent in the center, as shown, for the crank. A small flywheel is attached to one end of the shaft. The connecting rod E, Fig. 1, is made of wood and fastened to the upper end of the driving arm D with a small screw or nail. The contact F is

made of a strip of copper; $\frac{1}{4}$ in. wide. This is to open and close the circuit when the engine is running. The connections are made as shown in Fig. 1.

Connect two dry cells to the binding-posts and turn the flywheel. The current passing through the magnet pulls the driving arm toward the bolt head, which gives the shaft a half turn. The turning of the shaft pulls the arm away from the copper piece F, causing a break in the current. As the shaft revolves, the arm is again brought back against the copper strip F, thus the current is broken and applied at each revolution of the shaft.—Contributed by S. W. Herron, Le Mars, Iowa.

Child's Home-Made Swing Seat

A very useful swing or seat for children can be made from a box or packing case. Procure a box of the right size and saw it out in the shape shown in the illustration. The apron or board in front slides on the two front ropes. The board can be raised to place the



Made of a Box

child in the box and to remove him. The ropes are fastened to the box by tying knots in their ends and driving staples over them.

Home-Made Water Motor

The small water motor shown in the illustration is constructed in the same manner as a German toy steam turbine. The wheel, which is made of aluminum $\frac{1}{16}$ in. thick and 7 in. in diameter, has 24 blades attached to it.

The lugs or extensions carrying the rim must be made from the metal of the wheel, therefore a circle 8 in. in diameter must be first described on the aluminum plate, then another circle 7 in. in diameter within the first and then a circle for the base of the blades, $3\frac{1}{2}$ in. in diameter. Twenty-four radial lines at equal distances apart are drawn between the two smaller circles and a $\frac{1}{4}$ -in. hole drilled at the intersecting points of the radial lines and the innermost circle.

Centrally between each pair of radial lines and between the two outer circles, $\frac{1}{2}$ by $\frac{3}{8}$ -in. lugs are marked out and the metal cut away as shown in Fig. 1. A $\frac{1}{8}$ -in. hole is then drilled in the center of each lug. Each division is separated by cutting down each radial line to the $\frac{1}{4}$ -in. hole with a hacksaw. Each arm is then given a quarter turn, as shown by the dotted lines in Fig. 2, and the lug bent over at right angles to receive the rim. The rim is made of the same material as the disk and contains twenty-four $\frac{1}{8}$ -in. holes corresponding to those in the lugs to receive brass bolts $\frac{1}{4}$ -in. long.

The disks PP were taken from the ends of a discarded typewriter platen, but if these cannot be readily obtained, they can be turned from metal or a heavy flat disk used instead.

The casing was made from two aluminum cake pans whose diameter was 8 in. at the base, increasing to 9 in. at the rim. The centers of these were located and a $\frac{1}{4}$ -in. hole drilled for the



FIG. 3

shaft. The disks P are the same as used on the wheel. Six holes $\frac{1}{8}$ -in. in diameter were drilled through the flat part of the rims while the two halves were held together in a vise. Bolts were placed through

these holes to join the casing when ready for assembling. One side of the casing was then bolted to two 4-in. ordinary metal shelf brackets which were

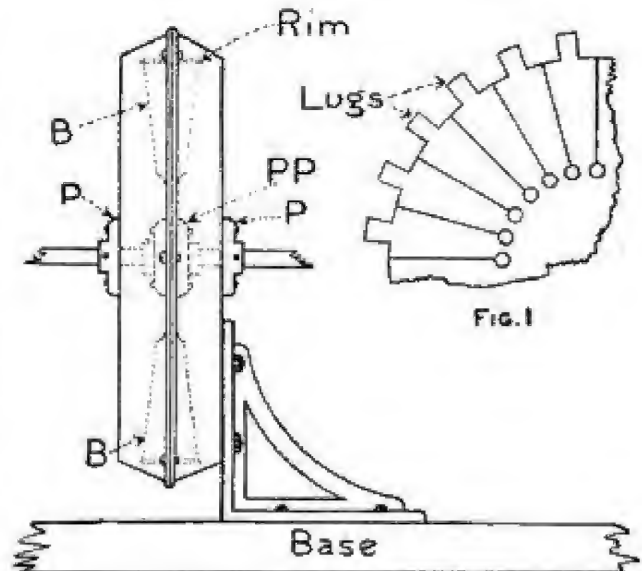


FIG. 1

FIG. 2
Details of Motor

screwed to a substantial wood base. This kept one-half of the casing independent of the main structure so that the wheel is easily accessible.

The nozzle was made of $\frac{1}{2}$ -in. brass pipe which was first filled with molten babbitt metal. When the metal was cool, a $\frac{1}{4}$ -in. hole was drilled halfway through the length of the tube, the hole being continued through to the other end by means of a $\frac{1}{8}$ -in. drill. The lower orifice was then slightly enlarged with a small taper reamer, and the upper portion of the bore was reamed out almost to the brass to make a smooth entrance for the water.

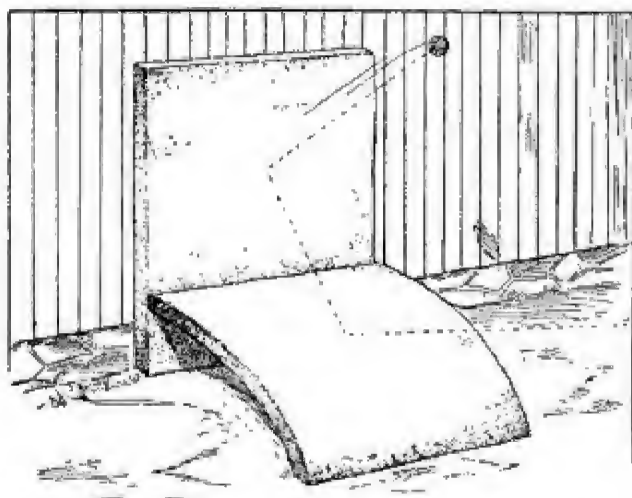
A fixture to hold this nozzle is shown in Fig. 3. It was cast of babbitt metal in a wood mold. The hole for the nozzle was drilled at an angle of 20 deg. to the plate part. An alternative and perhaps easier way would be to insert the nozzle in the mold at the proper angle and cast the metal around it. A hole was then cut in one of the sides of the casing at a point $2\frac{7}{8}$ in. along a horizontal line from the center. The nozzle fixture was then bolted on with

the exit orifice of the nozzle pointing downward and through the hole in the casing.

Six $\frac{1}{8}$ -in. holes were drilled through the flat portions of the rims while the two halves of the casing were held securely together in a vise. Bolts were used in these holes to join the casing.

Device for Baseball Throwing Practice

Anyone training to be a baseball player will find the device shown in the accompanying illustration a great help



Ball Bounding on Concrete Slabs

when practicing alone. It consists of two cement slabs, one flat and upright, the other curved and on the ground. The vertical slab is fastened securely against a fence, barn or shed. The barn or the shed is preferable, for if the slab is fastened to a fence, the ball will bound over a great many times and much time will be lost in finding it.

The player stands as far as he cares from the slabs and throws the ball against the lower slab. The ball immediately rebounds to the upright slab and returns with almost as great a force as it was delivered. If the thrower does not throw the ball exactly in the same spot each time, the ball will not rebound to the same place, consequently the eye and muscles are trained to act quickly, especially if the player stands within 15 or 20 ft. of the slabs and throws the ball with great force.

The wheel was used on the drip-board of a kitchen sink and no provision was made to carry off the spent water except to cut two $\frac{1}{2}$ -in. holes in the bottom of the casing and allowing the waste to flow off directly into the sink.—Contributed by Harry F. Lowe, Washington, D. C.

This apparatus also teaches a person to throw accurately, as a difference in aim of a few inches on the lower slab may cause the ball to fly away over the player's head on the rebound.—Contributed by F. L. Oilar, La Fayette, Indiana.

How to Mail Photographs

Cut a piece of cardboard 1 in. longer and 1 in. wider than the mount of the photograph and lay the picture on it in the center. This allows a $\frac{1}{2}$ -in. border on all sides of the photograph. Punch two holes 1 in. apart at A, B, C and D, Fig. 1, in the cardboard border close to the edge of the picture. Put a string up through the hole B, Fig. 2, then across the corner of the photograph and down through the hole C and up through hole D, then to E, etc., until the starting point A is reached, and tie the ends.

The photograph will not get damaged, if it is covered with tissue paper and placed with the face to the cardboard. The extension border of cardboard prevents the edges of the mount from being damaged and the corners

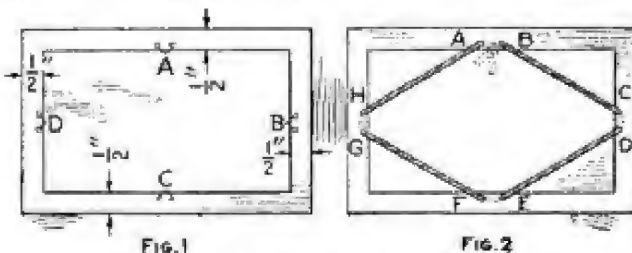


Fig. 1

Fig. 2

Back for Mailing Photo

from wearing. Both cardboard and photograph are wrapped together in paper, and the package is ready for mailing.—Contributed by Earl R. Hastings, Corinth, Vt.

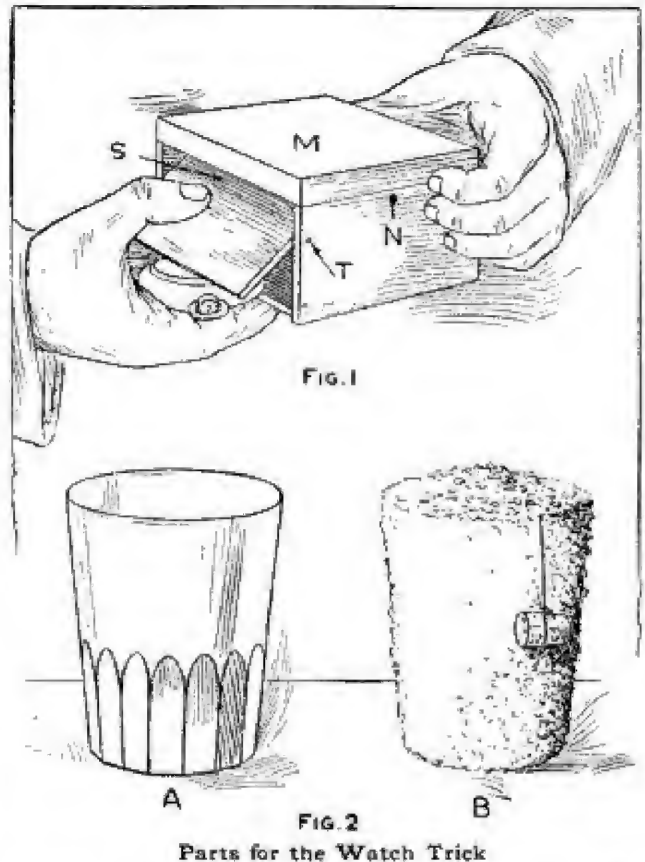
A Mystifying Watch Trick

Borrow a watch from one of the audience and allow the owner to place it in the box, as shown in Fig. 1. This box should be about 3 in. long, 4 in. wide and 2½ in. deep, says the Scientific American. It should be provided with a hinged cover, M, with a lock, N. The tricky part of this box is the side S, which is pivoted at T by driving two short nails into it, one through the front side and the other through the back, so that when S is pushed in at the top, it swings around as shown in Fig. 1 and allows the watch to slide out into the performer's hand. The side S should fit tightly when closed, so that the box may be examined without betraying the secret. As the side S extends down to the bottom of the box, it facilitates the use of the fingers in pulling outward at the lower part while the thumb is pressing inward at the top part. The side of the box opposite S should be built up in the same way, but not pivoted.

Use a flat-bottom tumbler, A, Fig. 2, containing an inner cone, B, for the reproduction of the watch. The cone is made of cardboard pasted together so it fits snugly inside of the tumbler. The cone is closed except at the bottom, then bran is pasted on the outside surfaces to make the tumbler appear as if filled with bran when it is in place. Place the tumbler with the cone inside on a table somewhat in the background. Put some loose bran on top of the cone and allow the cork, attached as shown in B, Fig. 2, to hang down on the outside of the tumbler, away from the audience. A large handkerchief should be laid beside the tumbler.

After the watch has been placed in the box, Fig. 1, the performer takes the box in his left hand, and while in the act of locking it with his right hand secures possession of the watch as previously explained. Tossing the key to the owner of the watch, the performer places the box on a chair or table near the audience and, with the watch securely palmed, walks back to

get the tumbler. Standing directly in front of the tumbler with his back toward the audience, the performer



quickly raises the cone with his right hand, lays the watch in the bottom of the tumbler and replaces the cone.

The loaded tumbler and the handkerchief are then brought forward, and the former is placed in full view of the audience with the cork hanging down behind it. The performer calls attention to the tumbler being full of bran and picks up some of it from the top to substantiate his statement. He then spreads the handkerchief over the tumbler, commands the watch to pass from the box into the tumbler and the bran to disappear.

The box is then handed to the owner of the watch so that he may unlock it with the key he holds. As soon as the box is found to be empty, the performer grasps the handkerchief spread over the tumbler, also the cork tied to the cone. Raising the handkerchief, he carries up the cone within it, leaving the watch in the bottom to be returned to its owner.

Sharpening Skates with a File

Two methods are shown in the sketches for filing skates—one for hollow filing and the other for filing flat

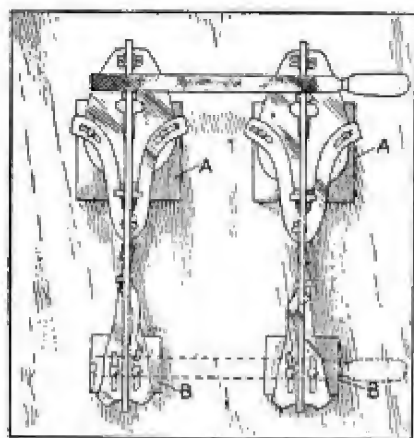


Fig. 1

Filing a Flat Surface

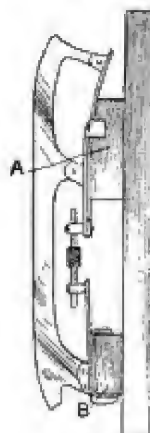


Fig. 2

and straight across the blade. The method shown in Figs. 1 and 2 is for filing the blade flat. The device for holding the skates consists of a board on which four blocks, AA and BB, are nailed. These blocks are fastened on the board in the relative positions of the heel and sole on a shoe. The skates are clamped on them in the same manner as on a shoe. A flat file is drawn across both blades of the skates as shown. After the roundness is cut down on the edges of the blades the skates are removed and the file is drawn along the sides to remove the

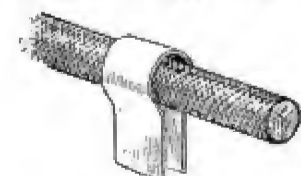


Fig. 3

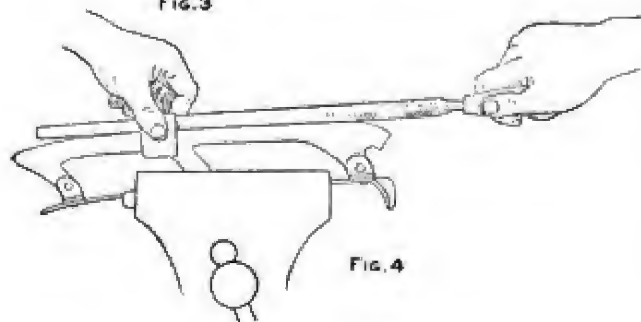


Fig. 4

Filing a Curved Surface

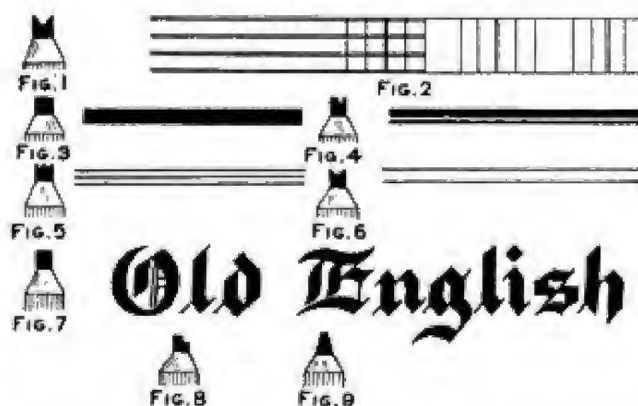
burr. Skates filed in this way have flat surfaces with sharp edges.

Some skaters like a hollow-ground skate and the method shown in Figs.

3 and 4 can be used for filing a slightly curved surface in the blade. A piece of tin or sheet metal is shaped over a round file as shown in Fig. 3. The manner of filing the curves is shown in Fig. 4. The piece of metal is held over the file and blade of the skate as the file is worked.

Lines and Letters Made with a Carpenter's Pencil

The sketch shows some unusual work made with a carpenter's pencil. If the flat lead is notched with a three-cornered file (Fig. 1), two parallel lines may be drawn at one stroke, or various rulings may be made, as shown in Fig. 2. Broad lines can be made, as shown in Fig. 3, or unequal widths as in Fig. 4.



Pencil Points and Their Work

In Figs. 2, 5 and 6 are shown lines especially adapted for the bookkeeper or draftsman. If one lacks the ability to draw old English letters with a pen, the letters may be first drawn with a carpenter's pencil (Fig. 7) and the outlines marked with ink and finally filled in. Narrow lines are made with points cut as in Figs. 8 and 9. A little practice with the carpenter's pencil in making these letters will enable the student to finally produce them with the pen used for the purpose.

Aluminum wire plunged hot into a cold solution of carbonate of soda becomes coated with a strong layer of oxide which forms an excellent insulator to electricity.

Wood-Working for Beginners

By IRA S. GRIFFITH

Chapter XIII—How to Make an Umbrella Stand

Typical Method of Laying Out and Working a Cross-Lap Joint

The umbrella stand (Fig. 81) and the other pieces that will be described hereafter are best made of quarter-sawed white oak. It should be purchased mill-planed to the desired thicknesses and should be well seasoned. Using the accompanying working drawing, Fig. 82, first make out a stock bill and then work the pieces to the sizes and shapes indicated. The back frame should be made first, then the bottom and front, next the sides and finally the pegs. The general directions for laying out duplicate parts as given for making the taboret apply to the making of this stand as well as to all other projects.

In the making of the back framework, a new joint has to be reckoned with, the cross-lap joint. Proceed as follows: Having squared up the pieces of the back to their proper sizes, measure from their ends the distance the nearer edge of the joint is to be and at this point square a sharp line across the edge. It is taken for granted that the pieces are to be worked in

point the location of the other edge. At this point square sharp knife lines across, using try-square and knife.

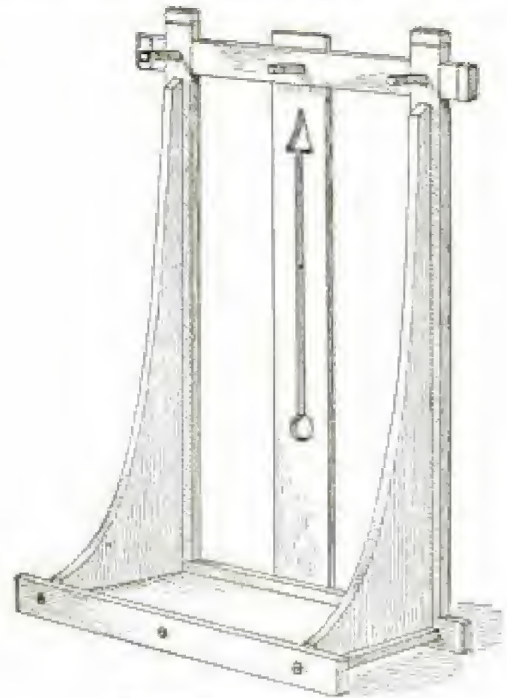


Fig. 81—Umbrella Stand

The pieces are to be so placed in the finished work that all the face sides shall be on the same side of the frame, therefore the cross lines will be on the face sides of half of the pieces but

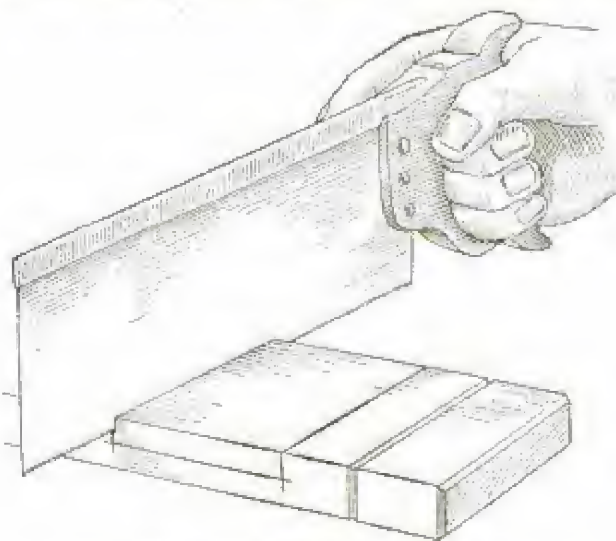


Fig. 83—Sawing on the Line

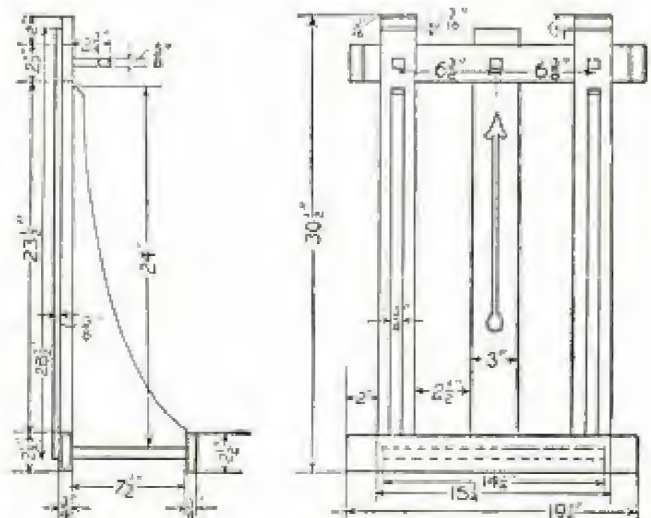


Fig. 82—Details of Stand

pairs. By superimposing one piece on the other, find and mark with the knife

across the back sides of the other pieces. It is well to lay the pieces in the posi-

tions they are to hold relative to one another in the finished piece and mark

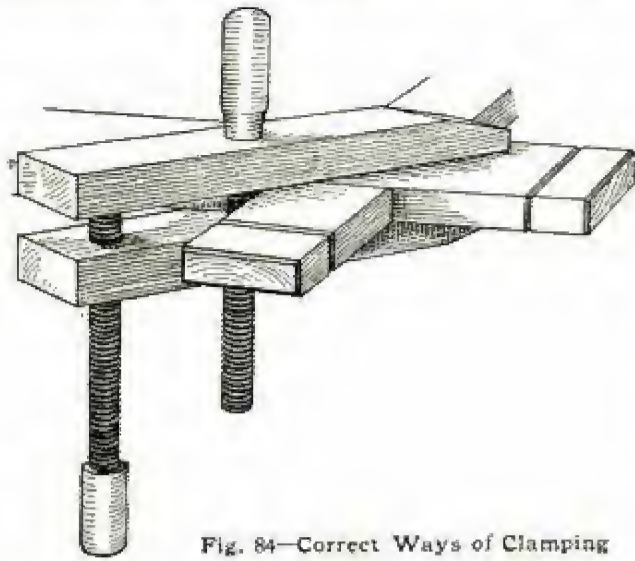


Fig. 84—Correct Ways of Clamping

the corresponding parts of the joints as was indicated in the making of the taboret. They may be marked temporarily with pencil marks but as soon as the joints are cut and the parts fitted, chiseled Roman numerals should be made in the bottoms of the grooves.

The parts of the cross-lap joint are to be laid out and the bottoms chiseled as was the dado of the taboret. Lines are carried across the broad surface where the groove is to be made, and down the two edges. Gauge lines between these knife lines, on the edges, indicate the depth. The gauge should be set to one-half the thickness of the piece. The same setting will serve all the pieces, but it is of the utmost im-



Fig. 85—Rotating a Clamp

portance that the head of the gauge be held against the face sides only of the

pieces. Beginners frequently think that because the groove is cut on the back side of some of the pieces that the gauging must be done from the back side. If the pieces were all of the same thickness, and the gauge set exactly in the middle of that thickness, no harm would be done. This is very seldom the case. If the head of the gauge is held against the faces, no harm can be done, for should the groove be gauged too deep on one part, the other part will have the groove correspondingly shallow and the faces will be even and smooth after the parts are assembled.

The sides of these grooves should be sawn exactly to the lines, the kerfs coming on the waste wood (Fig. 83). The wood being hard, no more paring than is absolutely necessary to make the parts fit properly should be required.

A good cross-lap joint is one in which the parts fit snugly, yet not so tightly as to spring the pieces out of line. Having fitted

the parts, scrape the pieces and fasten the joints, using good hot glue and hand clamps.

Figure 84 shows the correct way of placing a hand clamp. Figure 85 illustrates the manner of rotating a hand clamp to open or close the jaws to the approximate setting. When the opening has been made, place the jaws, then tighten the shoulder spindle and after that the end spindle. In releasing a clamp, the end spindle must be released first.

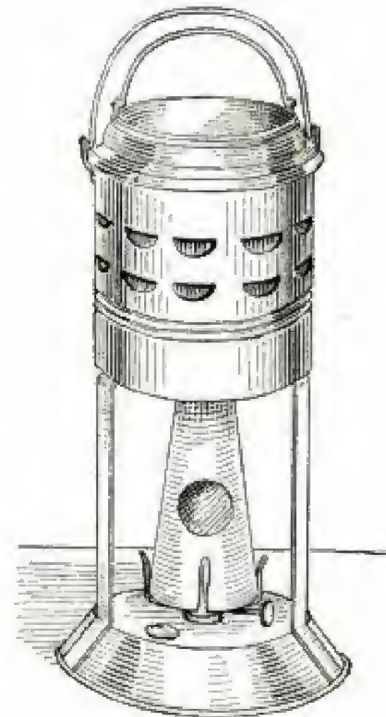


Fig. 86—Glue Pot

Hot glue is obtained by boiling chip glue in a double boiler, Fig. 86. In the outer boiler is water. The glue in the inner boiler is heated by the steam and hot water of this outer boiler. To prepare the glue, place the chips in the inner boiler and pour water over them so that they are just covered. Allow them to soak over night, then heat. Cabinet workers usually heat the wood too in cold weather, a warming oven of steam pipes being used.

While the glue is hardening, the

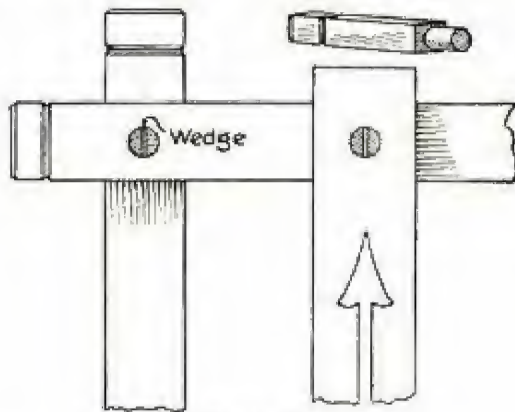


Fig. 87—Wedging the Pegs

other parts may be made. There is nothing requiring special instruction except, perhaps, the design. The arrow is merely suggestive. The one end is made by boring a hole through the slat. The shaft is cut with the rip saw. The head is sawn with a coping saw or scroll saw.

Plane the pegs up in one piece. They are to be "let in" to holes bored into the frame. Use glue and in addition wedge the peg tenons from the back, Fig. 87.

By working the end pieces as in Fig. 88, lumber will be saved. Put the rest of the frame together by means of screws.



Fig. 88—Cutting End Pieces without Waste

A copper drip pan should be made for the bottom. The copper need not be

heavy since the tray is supported on all sides.

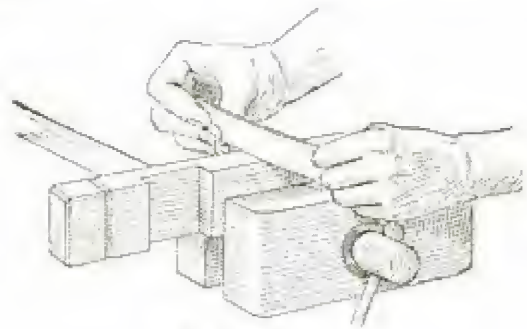


Fig. 89—Scraping

In this, as well as in making the pieces of furniture to be described later, it will be necessary to have a cabinet scraper for smoothing the surfaces. The mill-marks should be removed as far as practicable with the smooth plane. The scraper is to follow and will be found necessary where the grain is curled or crossed. There are special forms of holders for the scraper steels, but they are not necessary. Figure 89 shows a scraper in use. It may be either pushed or pulled. For a scraper to do good work it must be sharp, be held at the correct cutting angle* for the burr formed and be bowed by pressing with the thumbs so as to make the middle of the cutting edge cut first

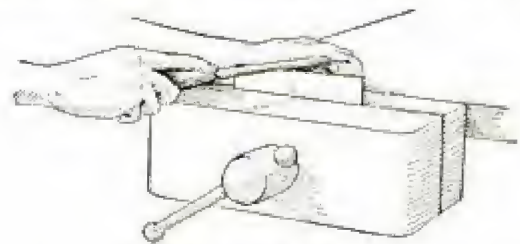


Fig. 90—Filing a Scraper

and most. A shearing cut is best and the stroke should be along the grain so that the hard grain may support the soft spring growth of wood.

When the scraper ceases to take off shavings, it should be sharpened. To do this: (1) Place the scraper in the vise and file the edge straight; it may be slightly rounded from end to end, if desired, and square across. (See Fig. 90.) (2) By means of the oil stone remove the wire edges and leave the edge of the scraper with good square corners. (See Fig. 91.) (3)

Again place the steel in the vise and using a burnisher, a smooth piece of

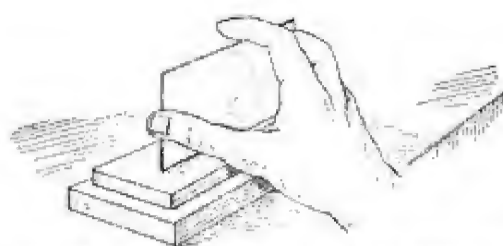
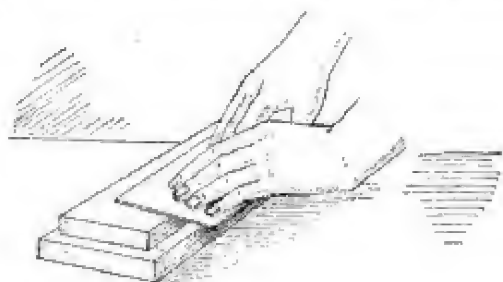


Fig. 91—Whetting and Removing the Wire Edge

steel, draw up the arrises, as in Fig. 92-A. (4) Now force the arrises down as in Fig. 92-B. The angle at which the scraper is to be held in cutting will depend upon the angle at which this

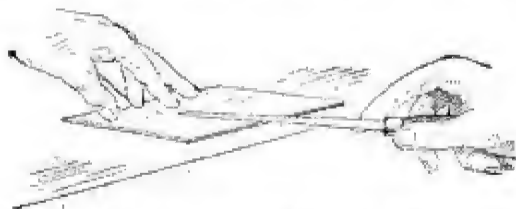


Fig. 92A—Flattening the Edge

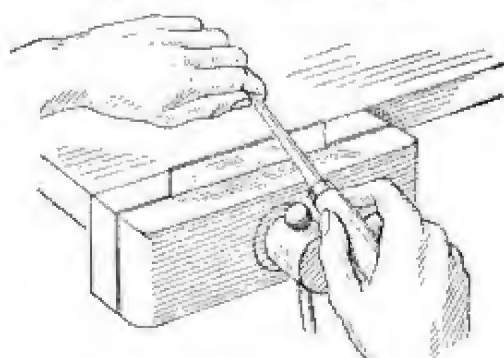


Fig. 92B—Turning the Edge

burr is formed with reference to the scraper's surface. It can be told only by trial.

(To be continued.)

Glue that is forced out of a mortise joint and allowed to become dry and hard can be easily removed with a sharp chisel dipped in oil.

Re-Inking Old Typewriter Ribbons

A solution of pure glycerine mixed with an equal part alcohol is prepared in a small deep pan, and to this is added any good dye or dry color of the shade desired. The best method is to add the dye and stir until it becomes incorporated with the alcohol and glycerine.

The old ribbons are soaked in this solution for at least 12 hours and then, by using one of the tiny wringers sold at toy stores, you can easily squeeze out all the surplus solution by running the ribbon through it. After the ribbon has dried, it may be smoothed out with a warm iron, but if you use care in the wringing process, this is not necessary.—Contributed by A. A. Houghton, Northville, Mich.

Imitating Ground Glass

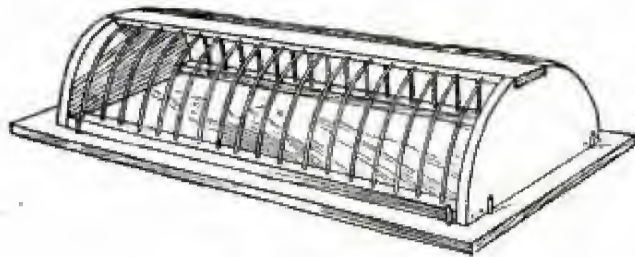
Make a mixture of white lead in oil, 1 part; varnish, $\frac{3}{4}$ part; turpentine, $\frac{1}{4}$ part, and add sugar of lead as a dryer. Make a very thin paint of this and use a broad, flat brush, says Master Painter. With care you may succeed in getting the paint on quite evenly all over, which is desirable. One coat will do. If it becomes necessary to remove this coating for renewal, it may be effected by an application of potash lye, or the old may be renewed by a coating of a mixture of 2 parts hydrochloric acid, 2 parts white vitriol, 1 part sulphate of copper (blue vitriol) and 1 part of gum arabic, applied by means of a brush.

Restoring Tone to a Cracked Bell

Many a bell with a deadened tone due to a cracked rim, can be given its original clear ringing sound by sawing out the crack with a common hacksaw. Make the saw cut along the line of the crack. The opening caused by the saw will allow the free vibration of the metal.—Contributed by F. W. Bently, Jr., Huron, S. Dak.

Feed Box for Chickens

The sketch shows the construction of a feed box designed to prevent the scattering of feed and give the coward

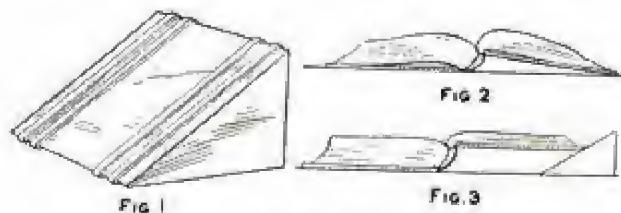


Chicken Feed Box

rooster as much chance to fatten as the game cock. The base may be made of a $\frac{1}{2}$ -in. board, 1 ft. wide and 3 ft. long, although any of the dimensions may be varied to suit special requirements. The ends are semi-circular pieces with a notch, $\frac{1}{4}$ in. deep and 3 in. wide, cut in the center of the rounding edge. The ends are connected together with a piece of wood set in the notches. The strip of wood is $\frac{1}{4}$ in. thick, 2 in. wide and as long as the box. Notches $\frac{1}{8}$ in. wide and $\frac{1}{8}$ in. deep are cut on the under side of this piece of wood, $1\frac{1}{2}$ in. apart. Heavy pieces of wire are bent in the form of a semi-circle, as shown. The wires are set in the $\frac{1}{8}$ -in. notches cut on the under side of the top piece of wood. The ends of the wires are set in holes in wood pieces joining the bases of the end pieces. The baseboard and top are separable.—Contributed by Maurice Baudier, New Orleans, La.

A Book Rest

A book that does not open flat is rather inconvenient to write in when one of its sides is in the position shown in Fig. 2. A wedge-shaped piece of

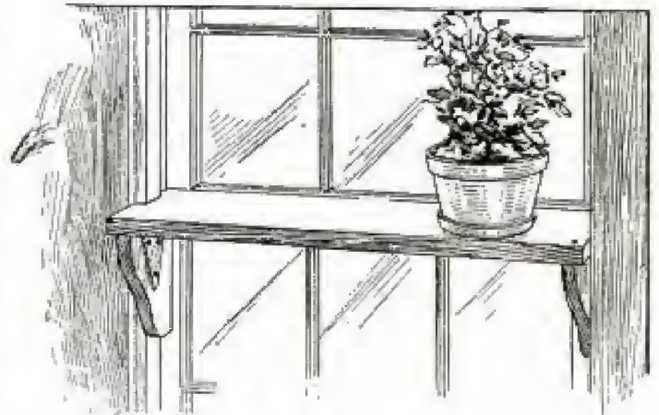


Book Back Holders

metal, stone or wood, as shown in Fig. 1, will, when placed as in Fig. 3, raise the sloping half to the level of the other pages. Cover the block with rubber, wide rubber bands or felt, to prevent its scratching the desk top. The block can also be used as a paperweight.

Window Shelf for Flower Pots

On the ledge formed by the top part of the lower sash of the window I fitted a board 7 in. wide into each side of the casing, by cutting away the ends. I placed a small bracket at each end of the shelf, so that it would fit solidly against the lower window sash to support the weight of the plants.



Shelf in Window

One of the brackets I nailed to the shelf and the other I held in place with a hinge, the reason being that if both were solid, the shelf could not be put on the window, as one end must be dropped in place before the other. Such a shelf will hold all the plants a person can put on it. When not in use, it can be removed without marring the casing.—Contributed by G. A. Wood, West Union, Ia.

Magnet for the Work Basket

Tie a ribbon or strong string to the work basket and fasten a large magnet to the other end. Needles, scissors, etc., can be picked up without any trouble. This device is very convenient for invalids.—Contributed by Nellie Conlon, Worcester, Mass.

INTERESTING PATENTS

SYSTEM FOR LAND DRAINING—An implement for preparing land for drainage, without digging or turning up the soil, is shown in Fig. 1. It presses the soil apart to form a narrow trench and then fills the trench with a drainage material.

BATHTUB WASH BASIN—Figure 2 shows a wash basin for bathtubs, provided with a bracket which holds it solidly under the bathtub faucets when in use and allows it to be swung back out of the way when not required. The bracket is made fast to the wall at the side of the tub.

SOLE AND HEEL PLATE TO PREVENT SLIPPING—The spiked devices shown in Fig. 3 provide the same protection for human beings as do the emergency ice shoes for horses. The pivotally connected plates carrying the spikes or spurs are held in position by prongs adapted to engage with the heels, and a strap which buckles over the toe. Thus the plates may be put on and removed like skates.

COMBINED CRUTCH AND CHAIR—A crutch that can be converted into a chair when the user desires to rest is shown in Fig. 4. The handle of the crutch forms the back support for the canvas seat, and the forward end of the seat is carried on legs, which fold into the crutch framing when the crutch is used in walking.

FRUIT-JAR WRENCH—Figure 5 is a wrench for the removal of tops from fruit jars. It comprises a main clamping plate provided with handles on which auxiliary clamping members are mounted.

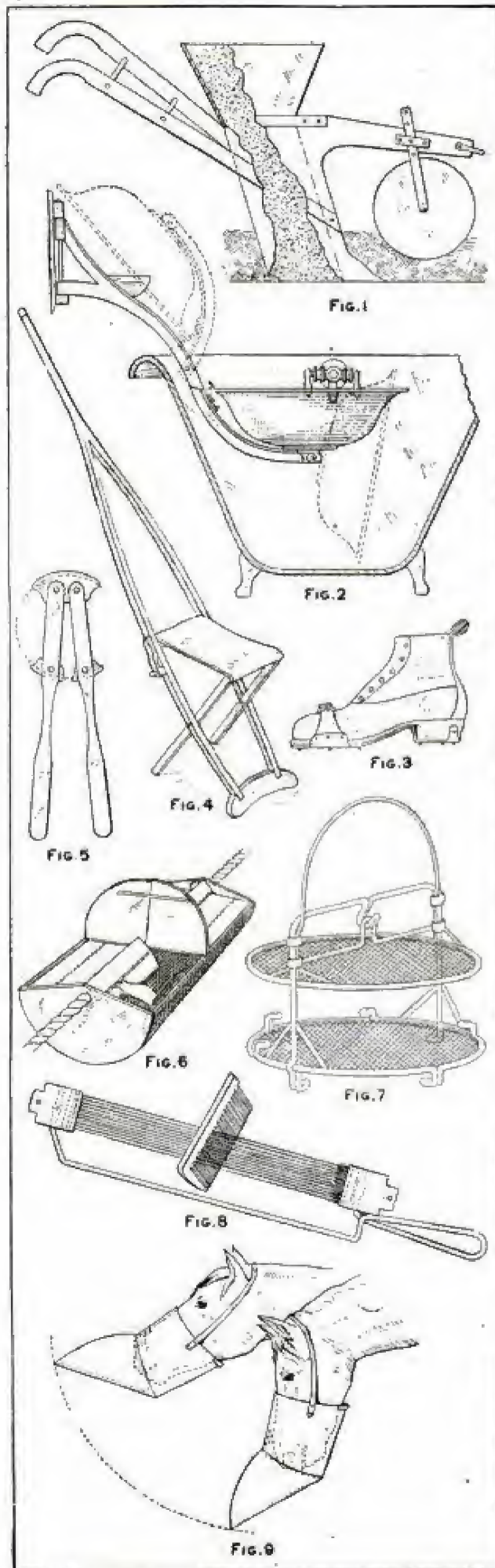
RAT TRAP FOR HAWSERS—A device which not only prevents rats from boarding ships by means of the hawsers, but captures them as well, is illustrated in Fig. 6. It comprises two cage sections, each having a trapdoor at the top. Skids are arranged over the hawser to slide the rat onto the trap doors, which tilt downward and drop him into the cage.

DOUGHNUT DIPPER—Figure 7 is a device for dipping doughnuts into the boiling lard in which they are to be cooked. The upper screen can be raised and lowered on the supporting standards.

COMB-CLEANING DEVICE—A comb cleaner comprising a set of spaced wires carried by a handle is shown in Fig. 8. A brush having its bristles disposed parallel with the wires is provided at one end to remove the matter loosened from the spaces between the teeth by the wires.

IMPROVED FEED BAG FOR HORSES—Anyone who has watched a horse tossing its feed bag in an endeavor to reach all the grain will see the reason for the shape of the bag illustrated by Fig. 9. The neck portion of this feed bag is like that of the ordinary bag, but the lower portion is a laterally extending pocket supported entirely from the lower end of the neck portion and provided with a flat bottom inclined to the axis of the neck portion. By lifting his head, the horse causes the angle of the flat portion of the bag to change and the grain slides into a position where it can be easily reached.

FIRE ESCAPE—The feature of this rope fire escape (Fig. 10) is the novelty of the arrangement and construction of the parts. The carrying device is a loop fastened by a swivel snap-hook to a zigzag block having a pair of pulleys and a pair of brake shoes journaled in it. The rope providing the means of escape is threaded zigzag through the pulley block so as to pass over the grooved face of the brake shoe at the upper end of the block, round the pulleys, and over the grooved face of the brake



PRACTICAL OR UNIQUE

shoe at the lower end of the block. The person using the escape may easily control the descent, either by setting the rope at an angle to the block, or drawing it inward in direct alignment with the block. All that is required to descend is to move the rope so that the lower brake shoe will tip with the grooved face in alignment with the groove in the lower pulley, which gives the rope a straight passage onto the lower pulley. With the friction of the lower part of the block thus removed, the block will descend, the upper brake shoe providing sufficient friction to limit the speed. An insensible person may be placed in the loop and the descent of the block be regulated by someone on the ground holding the rope taut or allowing it sufficient slack to tip the lower brake shoe.

♦ ♦ ♦

CUFF MEMORANDUM TABLET—Figure 11 shows a memorandum attachment for the cuff, designed to reduce the laundry bills of men who have contracted the habit of making notes on shirt cuffs. It is a celluloid tablet carried between the cuff and the coat sleeve. Ordinarily concealed from view under the coat sleeve, it may be drawn out when required for notes.

♦ ♦ ♦

SHAMPOO SHIELD—This device (Fig. 12) which might be taken for a curious hair ornament of a savage people, is a protecting shield for use when washing the hair. It comprises a steel frame and a piece of rubber sheeting, providing an opening for the head.

♦ ♦ ♦

CIGAR PIPE—Figure 13 is a pipe disguised as a cigar. The tobacco is placed in the bore running through the center of the cigar-shaped casing. Air conduits are provided to make the pipe draw properly. The inner surface of the cylindrical portion is lined with asbestos, and an asbestos coil is located between the mouthpiece and the bore.

♦ ♦ ♦

PIPE SCRAPER—Cutting away the "cake" in a pipe is a rather disagreeable task, and also spoils the blades of a pocket knife, but a scraper such as is shown in Fig. 14 cleans out the bowl quickly and evenly.

♦ ♦ ♦

AUTOMOBILE ROBE—Figure 15 is a robe designed especially to protect motorists in cold weather. It has a waterproof lining and is shaped to fit closely around the limbs. Cords are provided at the bottom to fasten it around the tops of the shoes.

♦ ♦ ♦

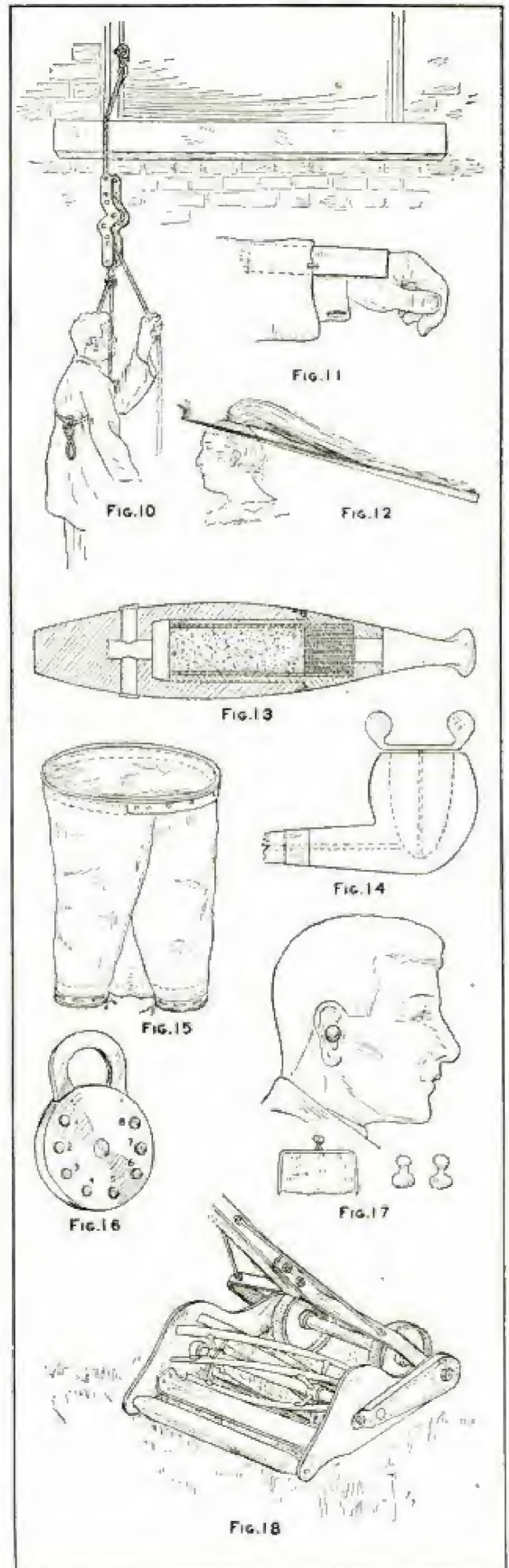
KEYLESS PADLOCK—This keyless padlock (Fig. 16) is unlocked by pressing the buttons on its face. There are eight buttons, any of which may be included in the combination. More than 40,000 combinations are possible. A quick and easy manipulation of the lock in the dark is made possible by the raised buttons.

♦ ♦ ♦

EAR STOPPERS FOR NERVOUS PEOPLE—These little ivory buttons or plugs (Fig. 17) were invented to take the place of the rather unsightly cotton wads often used by nervous business men for the purpose of excluding the nerve-racking noises of city streets, factories and offices. They are now being marketed in France in purses similar to those used for the carrying of coins.

♦ ♦ ♦

NEW TYPE OF LAWN MOWER—The ordinary lawn mower has the knives mounted on the same shaft that carries the wheels, but in this machine (Fig. 18) the knife is located midway between the traction wheels and the roller. The drive is by chain and sprocket gear.



THE infant has been at it again.

"Dad," he asked, "does it cost much to keep a lion?"

"It does, my son."

"A wolf would make a good meal for a lion, wouldn't it, Dad?"

"Yes."

"And a fox would be enough for the wolf, wouldn't it, Dad?"

"I suppose so. Go on and play."

"A fox would be satisfied with a hawk and a sparrow would satisfy a hawk eh, Dad?"

"H'm! If you don't go away—"

"And the spider would make a meal for a sparrow?"

"Yes, yes! Now—"

"Wait a minute, Dad. Now we're coming to it. A spider would be satisfied with a fly, wouldn't it?"

"Ye-es, my son."

"And a drop of molasses would be enough for a fly, wouldn't it?"

"Well, supposing it would?"

"Yes; that's just it, Dad. Now, what I want you to tell me is this: Could a man keep a lion for more than a year with a quart of molasses?"

And then the sound of a falling slipper awoke the echoes of the still night.—Brooklyn Eagle.

♦ ♦ ♦

An engineer on a branch railway had frequently stopped his train to drive the superintendent's cow from the tracks, and by so doing invariably missed his connection at the end of the line, and received a severe reprimand.

One evening he became impatient and ran the cow down. Again he was called to the office, and asked why he had not stopped his train and driven her from the tracks.

"Well, boss," he replied, "if you want to run a cow on this road why don't you put her on the time card so I'll know where to pass her?"

"The motor car is fast superseding the horse."

"I've no doubt of it. I found a bit of rubber tire in my sausage this morning."

♦ ♦ ♦

A reporter was interviewing Thomas A. Edison. "And you, sir," he said to the inventor, "made the first talking machine?" "No," Mr. Edison replied. "The first one was made—long before my time—out of a rib."

♦ ♦ ♦

"Well, yes," confessed honest Farmer Hornbeak, the while a grim grin wrinkled his weather-beaten complexion. "It's a good 'eal o' trouble, but the satisfaction I feel amply repays me for the extra work. Ye see, by degrees I'm sharpenin' up the top of every stump on the place, and in the course o'

time I hope to have matters so arranged that the hired man will find it fully as comfortable to stand up durin' the day as to set down."

—Puck.

♦ ♦ ♦

Mulligan, the contractor, put up a church building. Dunn was building inspector then, and when he saw the church he said: "Pat, it isn't plumb."

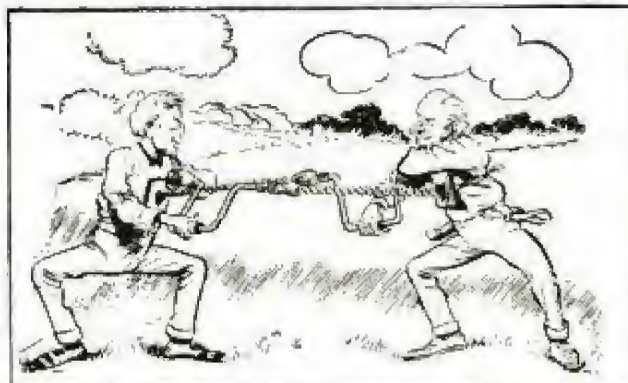
That made Mulligan pretty mad. He climbed right up and began to take measurements. Having squinted down the plumb line in a dozen different places he was ready to report. There was a ring of triumph in his voice.

"Mr. Dunn," he said, "Come and look at it y'rself. Plumb, eh? By th' piper that played before Moses, it's more than plumb!"—Cleveland Plain Dealer.

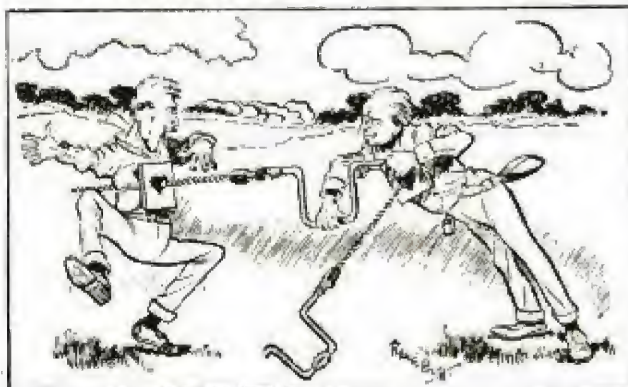
♦ ♦ ♦

She—So you've been up to see the Browns. Is their new flat very small?

He—Well, they've had to exchange all their statuettes for bas-reliefs. —Montreal Star.



Why not a brace and bit duel? A piece of inch board is strapped over the heart of each combatant



The man who gets through first wins
QUITE A BORING AFFAIR: SATISFYING HONOR—
NEW STYLE

NEW BOOKS

Any book mentioned or reviewed here may be ordered direct from the publishers or through Popular Mechanics Book Dept., 225 Washington Street, Chicago.

BROOKES' AUTOMOBILE HAND BOOK—A work of practical information for the use of owners, operators, automobile mechanics and technical schools.—By L. Elliot Brookes. 701 pages, large pocket size. An up-to-date treatise, dealing in a practical manner with all the questions relating to the construction, care and operation of gasoline, steam and electric automobiles. Frederick J. Drake & Co., Chicago, Ill.

WEBSTER'S NEW INTERNATIONAL DICTIONARY—Price \$10 up, according to style of binding. A completely rewritten work, superseding the well known International Dictionary, but contains 2700 pages as against 2300 in the latter, although by using thin paper, the bulk is not increased. Contains 6,000 illustrations and over 400,000 entries, more than double the number in the International. Unique division of page and graded

sizes of print permit the inclusion of some 34,000,000 ems of type matter, equal to 15 volumes of a standard-sized encyclopedia. It is complete, up-to-date, scholarly and reliable. G. & C. Merriam Co., Springfield, Mass.

SCIENTIFIC AMERICAN CYCLOPEDIA OF FORMULAS—1977 pages, Octavo (8½x8¾ in.) Contains over 15,000 useful formulas and processes, classified and arranged into chapters containing related subjects, with complete index. Cloth, \$5.00. Munn & Co., New York.

THE LIGHTKEEPER—A unique publication; issued twice yearly, June and November. June number on sale May 1st. 72 pp. or more. Contains matter of interest to light keepers and is profusely illustrated. Price (U. S. A.), 80c a year, postpaid. Sam'l H. Strain, 21 Lincenhall St., Belfast, Ireland.

Find Your New HOUSE in Our Plan Book!

**Build It Complete—at Half the Usual Cost
We Supply Everything, at Wholesale Prices!**

Our Book of Beautiful, Practical Homes KEEPS COST WITHIN ESTIMATES

The Gordon-Van Tine Co. Book of Plans is not a "theoretical" publication, based upon some architect's "guess" as to cost of completing the homes shown in pictures and "blue prints." Every house in it has actually been built at the price stated and can be duplicated at the same figures. The architects who drew the plans are in the employ of America's Greatest Building Material Plant and are posted on prices of materials as well as on styles of architecture.



Houses, Cottages, Bungalows, Costing \$600 to \$6,000

are shown in this beautiful Plan Book—actual photographs of real homes! Beauty, convenience and economy in cost have received equal consideration. The result is a wonderful book that safeguards the home-builder against disastrous bills for "extras."



Our Great FREE Home-Builders' Catalog Offers 5,000 Bargains in Millwork and Lumber DIRECT FROM MILL TO USER

We operate the largest independent Building Material Plant in the United States. We sell all our goods direct to the user. This saves the combined profits of the various middlemen which the user must pay if he buys from the retail dealer. We carry an enormous stock of bright, new goods, in great concrete warehouses, ready for immediate delivery. We ship wherever railroads go. Our prices are the same to all—whether you buy a few doors and windows or order in carload lots.



We Save Home-Builders of America A Million Dollars a Year!

We are supplying immense quantities of Building Material to home-builders, contractors and city and suburban real estate operators throughout the country. Our wholesale prices save our customers over a million dollars a year. One customer alone has built 150 houses, from material furnished by us. Ask for the names of near-by customers.



We Guarantee Quality, Safe Delivery and Satisfaction on Doors, Windows, Mouldings—EVERYTHING!

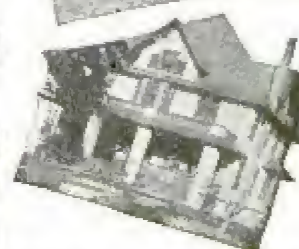
The Gordon-Van Tine Guarantee of satisfaction or money back gives you the most ample protection.

Bank References We have been established here since 1865. Our financial responsibility is unquestioned. We refer you to the Scott County Savings Bank of Davenport, Iowa; the Iowa National Bank of Davenport, Iowa; the Bankers' National Bank of Chicago, or any bank in America. See our rating in Dun's or Bradstreet's Commercial Agencies.



Get Our FREE BOOKS Before You Let the Contract!

Write for Home-Builders' Catalog and Book of Plans. Send your list of materials for Free Estimate.



In ordering Plan Book, enclose 10c for postage and mailing.

(93)

GORDON-VAN TINE CO., 2549 Case St., Davenport, Iowa

Amatite

ROOFING



**"THIS IS THE
ROOFING THAT
NEEDS NO PAINTING"**

Frequently the cost of painting a roofing amounts to almost enough to buy a new Amatite Roof.

A MATITE means more to the man who needs a roofing than just merely something to put on the top of a building.

It means a thoroughly satisfactory and reliable roof covering, without future *expense for painting*—because the *real mineral surface* makes painting unnecessary.

Amatite can be laid right over shingles, tin or other ready roofings. The directions hold good for laying Amatite anywhere and over anything, and are as simple as A B C.

For further information, booklet, samples etc., address nearest office.

BARRETT MANUFACTURING COMPANY

New York
Cleveland

Chicago
Pittsburg
New Orleans

Philadelphia
Cincinnati
Seattle

Boston
Kansas City
London, England

St. Louis
Minneapolis





Will YOU Be Ready When YOUR Chance Comes?

Will YOU be chosen as the right man when the big opportunity comes? Are YOU better prepared to rise from the ranks than the men beside you?

Could you fill satisfactorily a position requiring knowledge of "hows" and "whys"? Could you direct the work of others so as to get the best results? Would any employer be safe to trust your planning and figuring and doing?

To make it short, have you any special equipment? Is there anything in you to command big pay?

Through the study of I. C. S. Courses, shop hands have become draftsmen, foremen, and superintendents; carpenters and masons have made themselves contractors, architects, or structural engineers; clerks have advanced to high-salaried places as advertising men, window trimmers, show-card writers, or chemists; farmers' sons have mastered electrical or civil engineering; miners have qualified for positions as inspectors, superintendents, or mining engineers; young men have prepared for Civil Service positions, or studied successfully surveying and mapping, illustrating and designing, automobile running, sanitary plumbing, textile work, navigation, or some other occupation covered by one of the 214 Courses of the I. C. S.

It will cost you nothing but postage to learn all about the salary-raising plan of the I. C. S.

Mark and Mail the Coupon NOW

International Correspondence Schools Box 372, Scranton, Pa.

Please explain, without further obligation on my part, how I can qualify for a larger salary and advancement to the position, trade, or profession before which I have marked X.

Electrical Engineering
Electric Lighting
Electric Railways
Electrician
Electric Car Running
Dynamo Foreman
Dynamo Tender
Wireman
Mining Engineer
Telephone Expert
Civil Engineer
Automobile Running

Mechanical Engineer
Mechanical Draftsman
R. R. Constructing
Concrete Construction
Architect
Contracting and Building
Architectural Draftsman
Plumbing & Heating
Chemist
Bookkeeper
Advertising Man
Civil Service Exams.

Name _____

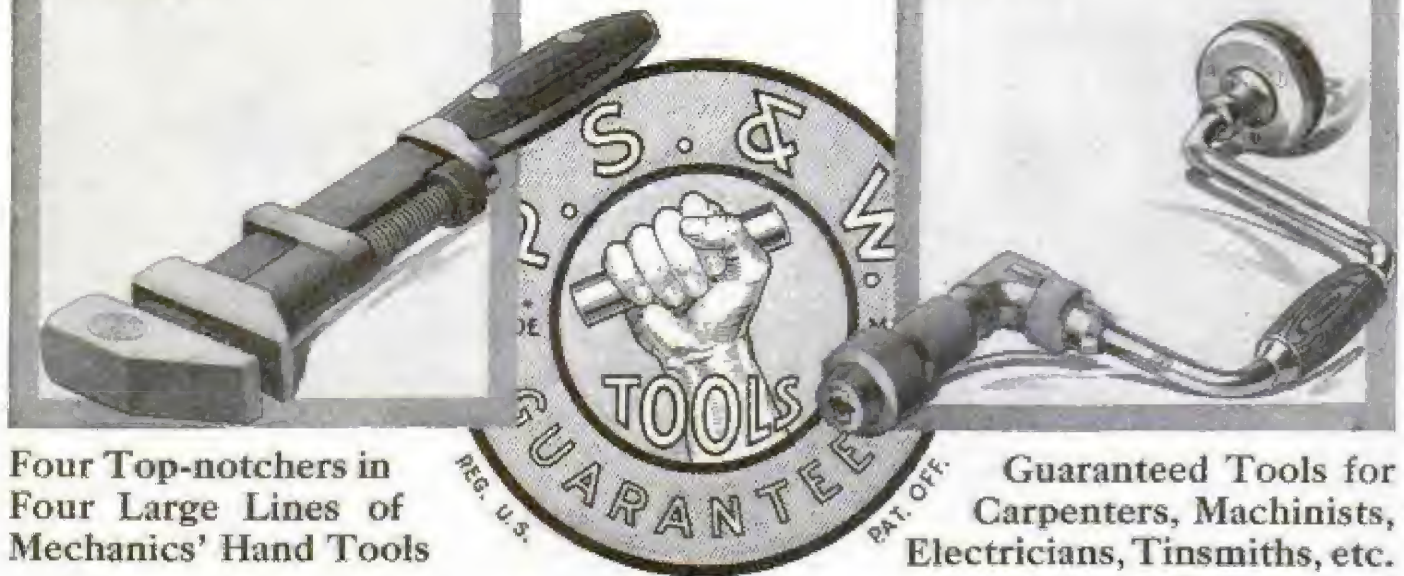
St. & No. _____

City _____ State _____

Present Occupation _____

The P. S. & W.
Solid Handle
Wrench

The P. S. & W.
Samson
Brace



Four Top-notchers in
Four Large Lines of
Mechanics' Hand Tools

Guaranteed Tools for
Carpenters, Machinists,
Electricians, Tinsmiths, etc.

Branded with The MARK of the MAKER

EVERY P. S. & W. Guaranteed Hand Tool carries our registered hand-tool Trade-mark, which stamps it as the highest product of nearly a century of able, experienced, and progressive tool-making. It is the guarantee mark of quality and excellence, for we put it only on tools that satisfy the most exacting requirements of critical users.

The P. S. & W. Samson Brace

The only brace made with the Ball-bearing Chuck.

It has bored ten-penny nails through solid oak, but tightens and releases so easily that a child could do it.

No other brace like it.

The P. S. & W. Solid-handle Wrench

Head, bar, ferrule and handle-frame are one solid piece of drop-forged steel. The sliding jaw, screw, and wood facing of handle are the only other parts. The strongest general purpose wrench made.

The P. S. & W. No. 30 Box-joint Plier

The adjustment of the handles gives greatest possible leverage. The cutting edges meet with absolute accuracy. It has no equal for strength, cutting-power and long life—a perfect tool for expert users.

The P. S. & W. 1819 Original Snip

Made of the best Norway iron, laid with special high-grade tool-steel.

No other snip has ever rivalled it in quality or in the favor of expert tinsmiths everywhere.

The Peck, Stow & Wilcox Co., MANUFACTURERS. of the Largest Line of Mechanics' Hand-tools Offered by Any Maker

Address Correspondence to
28 Murray Street, NEW YORK CITY

Established 1819
Five Large Factories

The No. 30
P. S. & W.
Box Joint
Plier



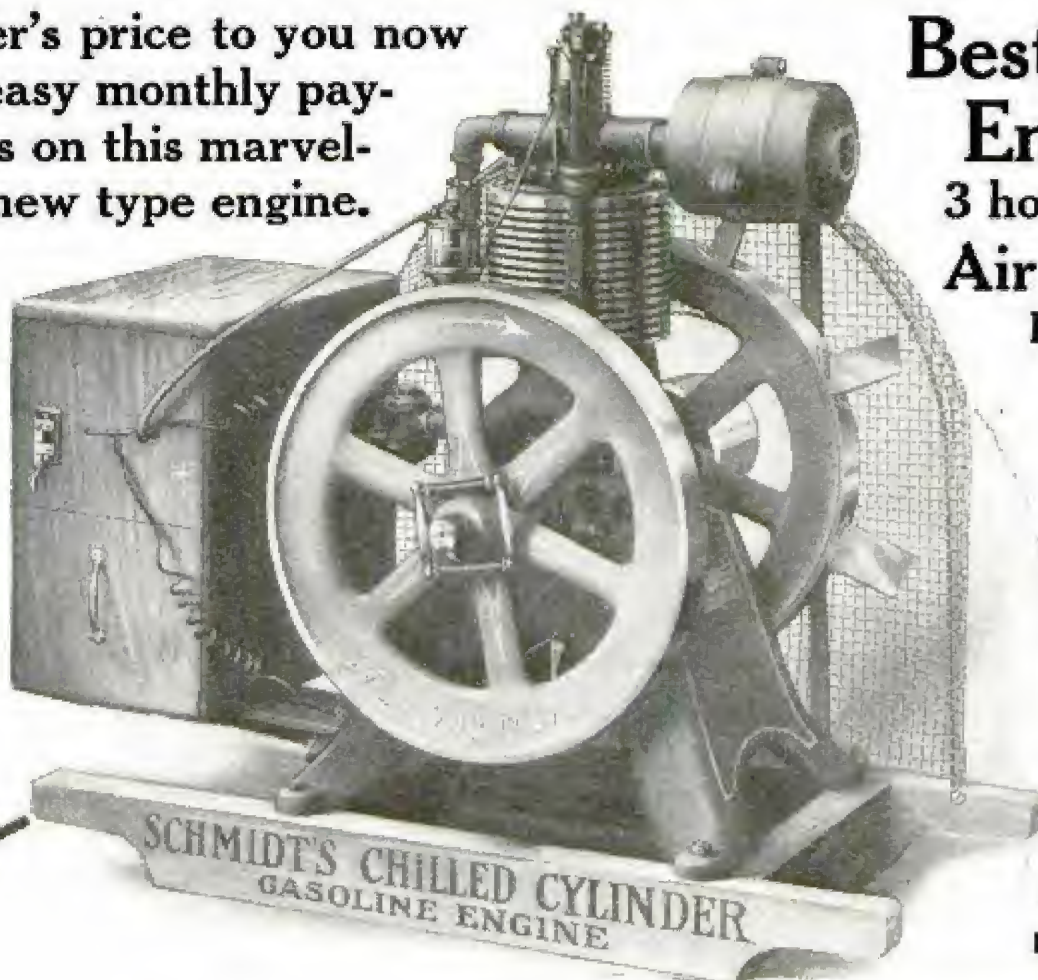
A Handy Book for Tool-Users

Our 165-p. "Mechanics' Handy List" shown above contains 35 pages of valuable shop information and a catalog of over 200 tools. Sent free at your request.

The 1819
Original
P. S. & W.
Snips



Dealer's price to you now
and easy monthly pay-
ments on this marvel-
lous new type engine.



**Best Shop
Engine**
3 horsepower.
Air Cooled.

Has a Spark
Retarder.
Send free
coupon.

TAKES UP
LESS FLOOR
SPACE.

FREE

This Marvel-
lous Chilled
Cylinder Gasoline Engine sent Free

Yes, absolutely free on the most liberal offer ever made. Use this engine ten days on your own place then send it back at our expense or keep it on easy monthly payments at dealer's price just as you choose. Send direct to the engine works and save dealer's profits.

Send No Money

Easy Payments

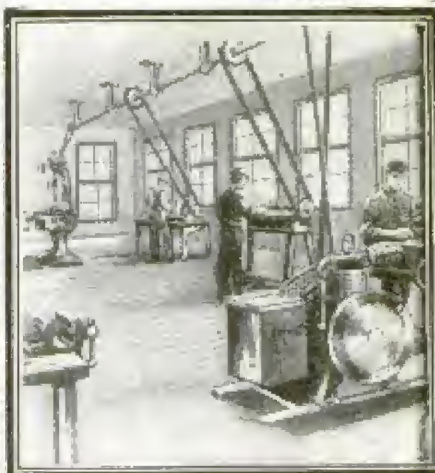
5 Years' Guarantee

SCHMIDT'S Chilled Cylinder Gasoline Engine is absolutely guaranteed in every part for five full years. You take no risk of any kind. You get the best and most economical engine on earth. The only engine with a chilled cylinder for all kinds of power work at the engine works' price. Send the free coupon now for catalogs and all particulars free.

Schmidt Bros. Co. Engine Works
Dept. 1194 Davenport, Iowa

Power Equipment for FARM OR SHOP.

Have your own power plant. With Schmidt's easy new type hangers, pulleys, shafting, bearing, etc., at small cost. On this special introductory offer you can get engine and power equipment at dealer's price. SEND FREE COUPON NOW



We send the engine to you on your request without a cent down in any way. Get all particulars of this amazing free offer.

Take long time to pay on your own security. No notes or mortgages. Same price as for all cash. Most liberal terms ever made to you.

FREE COUPON

Schmidt Bros. Co. Engine Works

Dept. 1194, Davenport, Iowa

Gentlemen: Without any obligations on me you may send me free and prepaid catalog explaining your new free offer and easy payment terms on Schmidt's Chilled Cylinder Gasoline Engine.

Name.....

Address.....

6 MONTHS FREE TRIAL

Special Offer on Shop and Factory Outfit

We want every tool user, every contractor, every shop and factory to try this grinding, buffing and polishing outfit for six months Free. We want you to test for a *whole half year* how this carborundum grinder saves tools, and time, and earns you money; makes tool-sharpening quick and easy and your general work easier. Try this outfit free for half a year, then, if you feel you can do without it, send it back. Return the coupon at the bottom of this page for details of this liberal 6 months' Free Trial Offer.

LUTHER DIAMOND TOOL GRINDER

Genuine Carborundum Wheels

The wheels are genuine Carborundum. Nothing is so hard as Carborundum except the genuine diamond. Wheels actually made of genuine diamond would cut no faster. Carborundum crystals are artificial diamonds, made by fusing the elements of real diamonds in the electric furnaces at Niagara Falls, in which fire brick melts and runs like butter. In this *utmost* heat, Carborundum crystals get a temper and sharpness that cuts hardest steel or toughest malleable iron as emery does copper. Carborundum wheels do not glaze—they peel steel away in tiny shavings at lightest touch—no hard pressure necessary, no frictional heat, no water cooling necessary, no danger of drawing temper. Genuine Carborundum wheels do not get soft in spots, wear lopsided. They outlast any number of emery wheels, saving that much money. They make it so easy to keep tools keen and bright, that tools are kept that way, and that means more, faster and easier work. They will not draw temper and tools last longer, which means another saving—to say nothing about the time saved in sharpening. But don't you take our word—prove these facts by a half year's free use of this splendid outfit.

Elmwood Haynes, of the Haynes Automobile Co., says: "I have found your machine a very satisfactory device."

COUPON

LUTHER GRINDER MFG. CO.

68 A Madison Street, Milwaukee, Wis.

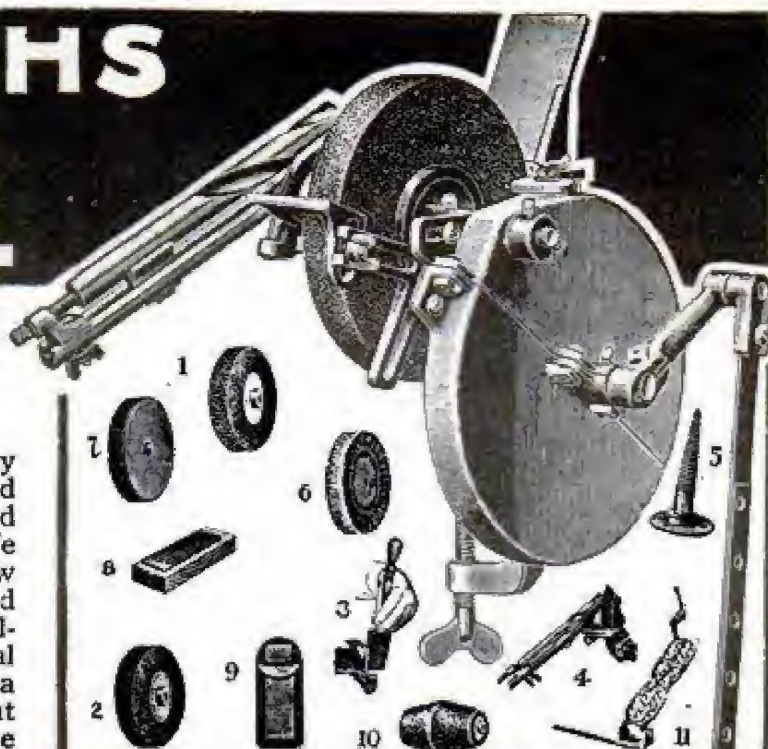
Please send me free and prepaid your free Carborundum booklets and 6 months' free trial offer on special shop and factory outfit.

NAME.....

ADDRESS.....

DEALER'S NAME.....

DEALER'S ADDRESS.....



11 Tools in One

This special offer on our shop and factory grinding, buffing and polishing outfit is a remarkable value—the greatest reasonably priced grinder offer ever made. This outfit, on which we will make a 6 months' free trial offer, consists of one Mechanic's Special Luther Diamond Tool Grinder, with the following accessories:

1. One rough, genuine Carborundum wheel
2. One fine, genuine Carborundum wheel
3. One chisel grinding attachment
4. One twist drill attachment
5. One polishing spindle
6. One buffer
7. One polisher
8. One oil stone
9. One Carborundum hone in leather case
10. One Carborundum scythe grinder
11. One foot power attachment

This outfit supplies every grinding, buffing and polishing need. The chisel and twist drill attachment make it easy for inexperienced persons to sharpen drills and chisels correctly.

Built Like a High-Grade Lathe

The Luther Mechanic's Special, forming the basis of this special shop and factory outfit, is built for a life-time of service—has steel and malleable construction, dust-proof, bronze bearings, machine cut spur gears, bearings run in oil bath—speed 2,500 revolutions per minute. Carborundum wheels guaranteed 5 years.

Return the Coupon for 6 Months' Free Trial Offer on Shop and Factory Outfit.

By returning this coupon you will not put yourself under any obligations whatever. We will send you full details of our Six Months' Free Trial Offer, and full description of this splendid grinding, buffing and polishing outfit, also the reprint from McClure's Magazine, telling the interesting story of the discovery of Carborundum.

Luther Grinder Mfg. Co.
68 A Madison St., MILWAUKEE, WIS.

When the Last Wheel Has Turned



the workman has to go through the "cleaning up" process before he can go home and be presentable.

Grease and grime work their way into the pores, and it's mighty hard to get rid of them. Ordinary toilet soap is

not equal to the task; **Pummo Soap** is, however. The fine Italian pumice creates just friction enough—combined with the cleansing value of the soap itself—to do the trick. There's just enough glycerine in **Pummo** to keep it from being harsh. Most hand soaps are about the consistency of bath bricks. **Pummo** cleanses quickly, thoroughly, marvelously—yet leaves the hands soft and velvety.

With all its virtues, **Pummo Soap** costs but **5c** a cake—packed in an individual carton.

If your dealer does not have **Pummo** in stock, write us, giving his name, and we will send you a free sample by return mail.

Made by

The N. K. Fairbank Company
CHICAGO



Please Mention Popular Mechanics

“MORSE”



TWIST DRILLS

Will give you a Square Deal
by drilling Round Holes!

Honestly and accurately made.
Improved up-to-date, scientific
methods are used throughout.

“MORSE” Tools are at work in
modern shops all over
the world where the highest efficiency
and greatest accuracy are demanded.

Send for a catalogue, it's illustrated,
interesting and free for the asking.

MORSE TWIST DRILL & MACHINE CO.

New Bedford, Mass., U. S. A.

Let Us Put This Piano in Your Parlor
Not a Dollar To Pay Us.

SEND NO MONEY

Enjoy This Piano—Take Your
Own Time—Sent to You
on 30 Days' Free Trial

Write right now and let us put this piano
in your parlor — not a dollar to pay us.

Let us send you our big, free, actual photograph, color-illustrated, handsome book, and offers to trust you absolutely with any celebrated and artistic Reed & Sons Piano on as long time as you want, even three years or more, if you are satisfied after 30 Days' Free Trial. Not a cent to pay down—not a dollar for any of our beautiful styles you select from the book we send you on



REED & SONS PIANOS

Established 1842. Given Highest Award
at World's Columbian Exposition, 1893

We've sold through dealers, jobbers and agents—for over 68 years—but now we have cut out their big profits and are giving the savings to our customers. We have made our direct-to-you wholesale factory prices so low that you can have a celebrated Reed & Sons Piano, for lifelong service, at a price as low as the price of many "cheap" made pianos—and get the highest artistic quality. Our 25-year guarantee bond goes with every Reed & Sons instrument. Hundreds have had generations of enjoyment from our pianos. So can you on our plan and prove it positively at our risk.

Now Sold Direct to
You From Factory

Saves you from \$128.00 to \$222.00 on price. No Security
— No Interest to
Pay—No Col-
lectors.



Also Self-Playing Pianos

Reed & Sons Self-Playing Pianos now sold on the most liberal plan. Thousands who "never knew a note" are now enjoying our Self-Players. See our offers and prices all explained in handsomest color-illustrated catalog sent free.

Take Your Own Time
—On Trying and Pay-
ing — We Pay Freight
Both Ways.

Take 30 Days' Free Trial in your home with your family and friends to judge the beautiful tone quality—handsome exclusive design and finish—easy action and splendid satisfaction. After a full year's enjoyment send our Reed & Sons Piano or Self-Playing Piano back and we'll pay the freight if not exactly as represented. That's the fairest offer ever made. It means 365 Days' Approval Test, besides 30 Days' Free Trial and 3 years' time to pay if satisfied. When absolutely satisfied you can pay \$1.00 a week, or by the month, or 3 months, or twice a year. We don't care how. Suit your own time. We want you to be happy with one of our pianos or self-playing pianos—prove it at our risk—right now. Write right now—a Postal Today—or the Coupon—For Our Big Book.

REED & SONS PIANO MFG. CO., 253 Wabash Ave., CHICAGO, ILL.

Capital and Resources, \$1,750,000.00—Largest Factory-to-Home Piano Manufacturers in the World.



Big Book Free

Reed & Sons Piano Mfg. Co.,
253 Wabash Ave., Chicago, Ill.

Please send me your Big Color Illustrated Piano Book and offer FREE. Everything at your risk.

Name _____

Address _____

Town _____ State _____

365 Days Approval Test



A MEDIAEVAL CONDITION

Telephone Service— Universal or Limited?

TELEPHONE users make more local than long distance calls yet to each user comes the vital demand for distant communication.

No individual can escape this necessity. It comes to all and cannot be foreseen.

No community can afford to surround itself with a sound-proof Chinese Wall and risk telephone isolation.

No American State would be willing to make its boundary line

an impenetrable barrier, to prevent telephone communication with the world outside.

Each telephone subscriber, each community, each State demands to be the center of a talking circle which shall be large enough to include all possible needs of inter-communication.

In response to this universal demand the Bell Telephone System is clearing the way for universal service.

Every Bell Telephone is the Center of the System

**AMERICAN TELEPHONE AND TELEGRAPH COMPANY
AND ASSOCIATED COMPANIES**

Please Mention Popular Mechanics

What \$1,000,000 Did

New Bargain Book Picturing 3,000 Furnishings Bought from 98 Hard-Up Makers—Sold for CASH or CREDIT at an Equal Price

Our whole business is buying and selling bargains in housefurnishings. We buy makers' surplus stocks—we relieve hard-up makers—we buy when they must have money.

Our harvest time is at the year end—just before inventory. Hundreds of makers then want to close out stocks, often far below the cost. If they cut to their dealers it would hurt their whole business, so the makers unload on us.

We went to these makers in November and December with \$1,000,000 in cash. And we picked up amazing bar-

gains in 3,000 things for the home. In our new Bargain Book we picture all of these bargains. The prices will save you up to 50 per cent. We want to mail you that book.

Pay as Convenient

We sell for cash or credit at an equal price. We have charge accounts with 600,000 homes. They have goods sent on approval, and pay as convenient—a little each month. We allow on the average over a year to pay, without any interest or any extra price.

We are glad to give credit to anyone who buys things for the home. There is no security, no publicity, no red tape—just an open charge account.

But just as you wish—pay cash or pay as convenient. Either way gets our lowest bargain price.

A Month's Trial

Every article is sent on 30 days' approval. You can use it a month before you actually buy it. If it isn't such a bargain as you expected you can return it, and we will pay freight both ways. The trial will not cost you a penny.

On these fair lines we have built up the largest business of our kind in America. You ought to know it. Such bargains, such variety, such pleasant dealing will appeal to you.

Bargain Book Free

This mammoth book of 3,000 bargains will be mailed you free. The size of the book is 12x24 inches. The pictures are large, and many are in actual colors. This is our latest book, and every housewife should have it—new customer or old.

Cut out this coupon and send it to us, and the return mail will bring the book. Please do this now before you forget it.

Bargains in

Furniture Silverware
Carpets Chinaware
Rugs Graphophones
Draperies Refrigerators
Stoves Washing Machines
Ranges Sewing Machines
Pianos Baby Cabs
Clocks Lamps, etc.

Cash or Credit

Cut Out This Coupon

SPIEGEL, MAY, STERN CO.
1460 35th Street, Chicago

☐ Mail me the Bargain Book.
☐ Mail me the Stove Catalog.

Name _____

Post Office _____

State _____

I am particularly interested in _____

No. 40X
695—Kitchen
Cupboard, built of
selected solid oak,
finished in golden. 78
in. high, 38 in. wide
and 16 in. deep. Has
3 adjustable top
shelves, 2 large drawers and
2 lower cupboards. Bought
from an overstocked man-
ufacturer below cost. Be-
yond a shadow of a doubt
the greatest Kitchen Cup-
board bargain ever
offered. Fully 50 per cent
saving guaran-
teed at



\$6.95

Cash or Credit



No. LX 485—English
Folding Go-Cart Bargain.
Newest 1911 design. We
take the factory output at a
specially low price. Has
steel frame, fabricord
leather upholstery and
large rubber tires. The
best collapsible go-cart on
the market. Fac-
tory bargain price

\$4.85

Cash or Credit

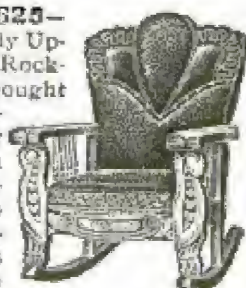


No. 30X1820—Steel
Range Bargain. Made in
our famous Empire factory.
One of the grandest ranges
ever built. We guarantee a
saving of at least one-third
on all stoves sold by us.
This style, bar-
gain price from
up, according to size.

\$18.20

Cash or Credit

No. 23X625—
A splendidly Up-
holstered Rock-
er. 8,200 bought
at a pre-in-
ventory
price from
a manufac-
turer who
gladly sac-
rificed his
profit to
turn these



rockers into cash before yearly
inventory. This is a massively
constructed rocker, upholstered
in our guaranteed fabricord
leather on a frame of solid oak,
richly carved, handsomely finish-
ed and immaculately constructed.
Unimpeachable bargain
at this factory price

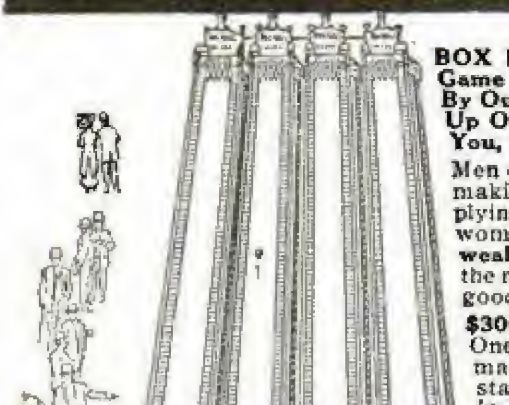
\$6.25

Cash or Credit

SPIEGEL, MAY, STERN CO., 1460 35th Street, Chicago, Ill.

(108)

We Start You in a Wonderful Money-Making Amusement Business of Your Own! —and GUARANTEE Profits!



BOX BALL—the Most Fascinating, Exciting Amusement Game of Years—Turns Your Time Into Easy Dollars!
By Our New Plan We Shoulder the Care of Starting You Up On Small Capital! Read How We Absolutely Protect You, By Our Profit-Guarantee-Bond.

Men of every class have been astonishingly successful in making big money from operating Box Ball alleys, supplying fun, amusement and clean entertainment to men, women, youth, boys and girls—they have piled up **wealth!** For the amazingly fascinating game has taken the nation by storm! Scarcely anybody ever fails to "make good"—and cash in big!

\$300 a month is a very conservative profit-estimate. One man at Sullivan, Ind., operating only **one** alley, made **\$513 clear profit** in 51 days! An **\$18-a-week** clerk started up and made **\$1,845.20 clear profit** first 60 days in business! Four others, **\$3,200 clear** first 9 months!

Hundreds of other successes equally astounding. Write to us for the letters written by the successful men themselves, telling the marvels of Box Ball money-making.

Men who are anxious to go into this money-making amusement business need no longer fear they will **not** succeed big!

Practically All Box Ball Operators Are Eminently Successful—So Profits Are Now GUARANTEED!

We absolutely insure you against failure or loss—so you will make big money! That is what our legally binding Profit-Guarantee-Bond means to you! If you don't make a profit we'll take the alleys back and refund every penny!

Box Ball earnings are practically all profits!

It's a **one-man** business, although partners have been tremendously successful! One man can run an entire battery of alleys—no pin boys, helpers or scorers are needed! A slight pull of lever at players' end automatically sets all pins instantly! Balls return to players' end by ingenious gravity device! So all operators do is pocket the entire receipts themselves!

The play is fast and furious—and at a nickel a game the money rolls into your cash drawer at a terrific rate! And no expenses to wipe it out, as with all other propositions. It's simply clear profit—practically every penny.

Box Ball stands higher in the estimation of people everywhere than any other pastime—it is attracting greater patronage from better classes of people than ever before!

And any man or woman who has or can get **small capital—\$120**—can start up in this business on a good, substantial scale! In a jiffy your alleys have paid for themselves, and are paying an **amazing profit** on the investment!

Get Into This Great Business Quick and Pocket Large Profits!

Right now is the ideal time of year to start up—so to be fully prepared for the tremendous

spring, summer and fall amusement business! Our beautiful 1911 Box Ball Alleys—equipped with **real, life-size bowling pins**—double the game's fascination to patrons—and hence, increase profits tremendously. Get into the business in which you are insured against losing out—get in **NOW!** Our big book of money-making plans and the complete story are yours for the asking.

Also ask us for the Box Ball monopoly for your territory—it's a **valuable privilege!** Another "live wire" may write for it tomorrow. You write today—this minute—to

The American Box Ball Co., 363 Van Buren St., Indianapolis, Ind.

Please Mention Popular Mechanics

From Chicago

I have had as high as eight alleys running in different locations at one time.

In one day these eight alleys took in \$72, which is an average of just \$9 per alley for that day.

I figure that above all expenses I have cleaned up on the Box Ball Alleys since I started, amounting over \$1,000 in cash.

M. Cushman.

From Texas

The business I have done is almost unreasonable, all of which I give the alley credit for. My receipts on the two places since I opened have been something over \$750.

Have just ordered another alley and business is booming.

Respectfully,
W. L. English.

From Ohio

I wish to tell you of my appreciation of the alleys I bought of you. I have run four 42-ft. alleys all last winter in town and all summer at Spring Grove Park, and am running them in town now and find they are the best investment I could make. As a money-maker they are all a person could wish for.

J. H. Vincent.

From Iowa

My Box Ball business is going far better than I expected. It amounts to \$12 to \$18 per day average.

O. S. Hand.

From Florida

My receipts on two alleys for December are \$362.75. The population in this little town is 1,500. Alleys have been running here one year and eight months.

J. C. Sharp.

From New York

I know for a certainty Box Ball Alleys are money-makers and are all you claim for them. I cleared over \$2,000 in one year from 2 alleys. I have now sold out for 30% more than I paid for them.

E. T. Scamard.

Are YOUR Hands Tied?

Do you want to get on—**SUCCEED**—earn more money? Is there a certain line of work you think you could do better in—if you only had the training? Or a certain kind of position you would like to hold—only you fear your “hands are tied?”

Don't let your ambition die! Don't think your hands are tied! Don't think that you can't strike out for advancement and *success*—that you do not dare, because you must eke out your daily bread—that you must go on in the same old rut as long as you live.

Get out of the crowd of ordinary *untrained* men—whose each day's work puts them *no further ahead*—for whom the future has no *promise*.

Start your advancement **NOW**—mark the coupon with a cross opposite the occupation you prefer, mail it *to-day*, and let the International Correspondence Schools give you full information on how they can *help you* to succeed as they have thousands of others—costs but postage—you incur no obligation.

Simply let the I. C. S. tell you how they can assist you to become an **EXPERT** in your chosen work—in your spare time—at home—no matter where you live or how little you now earn.

Your hands are not tied. Victory is within your reach—you can succeed.

It's a winning game for you—if you will only enter.

More than 300 I. C. S. students monthly **VOLUNTARILY** report increases in pay due to I. C. S. help—363 in November.

The world owes you *success* if you demand it—the world owes you nothing if you do not.

Mark the coupon—make your beginning **NOW!**

This Coupon is for YOU

INTERNATIONAL CORRESPONDENCE SCHOOLS. Box 872, SCRANTON, PA.

Please explain, without further obligation on my part, how I can qualify for the position, trade or profession before which I have marked X.

Automobile Running
Mine Superintendent
Mine Foreman
Plumbing, Steam Fitting
Concrete Construction
Civil Engineer
Textile Manufacturing
Stationary Engineer
Telephone Expert
Mechanical Engineer
Mechanical Draftsman
Electrical Engineer
Electric Lighting Supt.
Electric Wireman

Civil Service
Architect
Chemist
Languages—
Banking
Building Contractor
Architectural Draftsman
Industrial Designing
Commercial Illustrating
Window Trimming
Show Card Writing
Advertising Man
Stenographer
Bookkeeper

Spanish
French
German
Italian

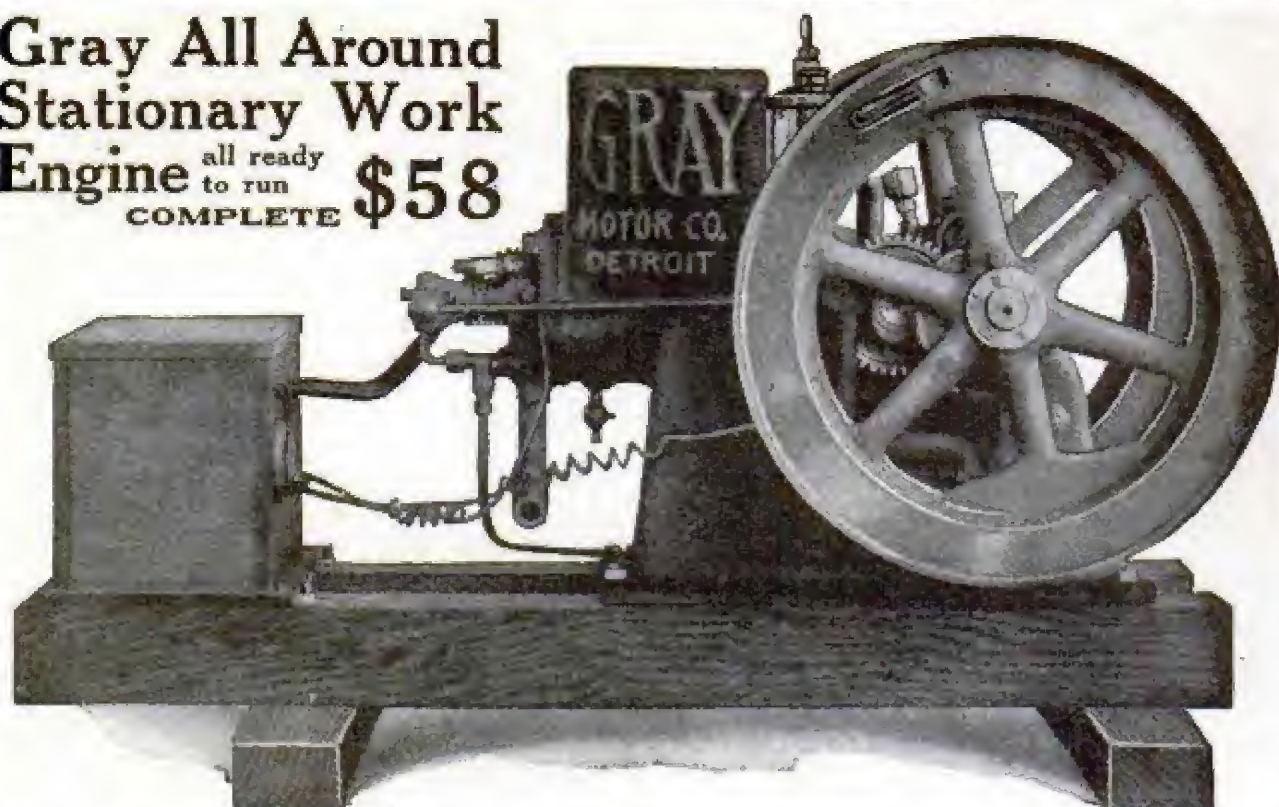
Name _____

Present Occupation _____

Street and No. _____

City _____ State _____

Gray All Around Stationary Work Engine all ready to run **\$58** COMPLETE



Built Right

A good small motor. Guaranteed the same as if it cost \$500, by a big responsible concern. Made to last a life time. A woman can run it. Hopper cooled. Powerful—good material, workmanship and finish. Comes mounted, already to run as you see it. Put in your gasoline and start it up.

Agents make big money selling it because it sells itself and makes no trouble after it is sold.

It looks good, runs good and is good. Occupies a field distinctly its own because of its high quality.

Write for agent's proposition today.

Gray Farm-Pumping and General Power Motors

Gasoline or kerosene, 3 to 36 horsepower.

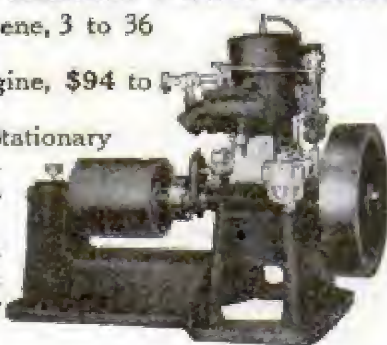
6. h.p. Farm Engine, \$94 to \$124 complete.

3 h.p. Farm and Stationary

Engine, \$65, guaranteed to develop 4 h.p.

24 h.p. Irrigation Pumping Engine,

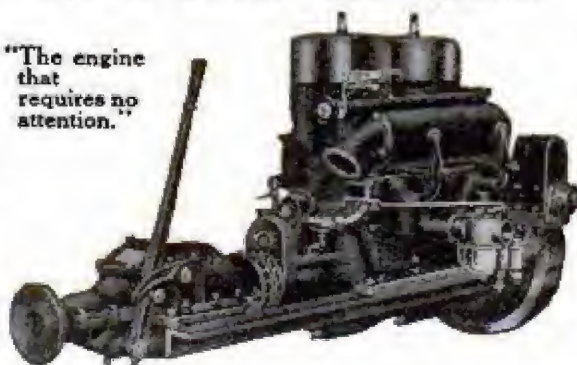
\$346—36. h. p. for \$560.



Gray Marine Motors

For Cruisers, Work Boats
Speed Boats and Canoes

"The engine that requires no attention."



3 h. p. \$60—6 h. p. \$89.50—12 h. p. \$188.00
24 h. p. \$330.00—36 h. p. \$528.00—Complete ready to install in your boat.

Absolutely guaranteed in every detail.

7 to 36 h. p.—1, 2 and 3 cylinders—combination 2 and 3 port.

Bosch High Tension Magneto—the most up-to-date marine engine built.

Write today for Big New Catalog

[Be sure to specify whether you want Marine or Stationary
Catalog, and what you want to use the engine for]

GRAY MOTOR COMPANY, 61 Leib St., Detroit, Mich.
Canadian Gray Motors, Ltd., 917 River Front St., Walkerville, Ont.



THE ONE PERFECT VISIBLE TYPEWRITER

THE FOX—"THE ONE PERFECT VISIBLE TYPEWRITER"—FOR 20 CENTS A DAY! Sent on **FREE TRIAL** to anyone—anywhere—at my expense—to be returned if not better than the best of other makes. If purchased you can pay me a little down after trial and the balance at the rate of 20 cents a day—no payments on Sundays and Holidays.

The Fox is Visible—you do not have to look beneath a lot of moving typebars to see what is written! It has a Back Space Key, Tabulator, Two-Color Ribbon with Automatic Movement and Removable Spools, Interchangeable Carriages and Platens, Card Holder, Stencil Cutting Device, Variable Line Spacer and Line Lock with Key Release. Its Speed is fast enough for the speediest operator or slow enough for the beginner. It is extremely Durable and almost Noiseless.

Will You Do This Now? I want you to fill out the attached coupon and give me a chance to "show you"—at my expense—what I have. Remember, I belong to no trust—no combination—and no one tells me at what price I must sell nor on what terms I must sell.



For 20 Cents a Day!



W. R. Fox, Pres. Fox Typewriter Co.

SEND FOR MY CATALOG, ANYWAY!

Date _____ 191__

W. R. FOX, President, Fox Typewriter Co.,
3804-4004 Front Street, Grand Rapids, Mich.

DEAR SIR:

Please send me a copy of your catalog and write me full particulars concerning your "20 cents a day" payment plan on the new Fox Visible Typewriter. It is distinctly understood that the signing of this coupon does not in any way obligate me to purchase, and that no typewriter is to be sent me unless I decide later to order one for free trial.

Name _____

Address _____

Business _____

H 15

FREIGHT PREPAID 30 DAYS FREE TRIAL
\$1 a Week For the Artistic
MEISTER
PIANO
SOLD DIRECT FROM FACTORY TO YOU



No Cash Down. No Interest.
No Extras.

Price \$175.00

STOOL and SCARF FREE

A guaranteed saving of \$100 at least, on each instrument

WE believe the correct way to buy a piano is to try it in your own home first. We don't want the trial to cause you any expense, hence we pay the freight—also the return freight if the piano is not entirely satisfactory.

Notwithstanding our easy terms of payments and our extremely low prices, the Meister is a high-class instrument of standard construction and quality fully guaranteed for 10 years. Ask your local banker to investigate our standing. Rothschild & Co's resources exceed \$3,000,000.00.

We sell more pianos direct from factory to home than any other concern in the world

Send A Postal for the Piano Book

It is free, and illustrates in the colors of the wood eight styles of the Meister

The Meister Piano Co.

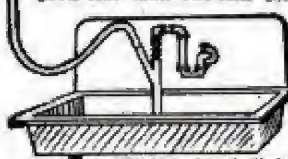
Rothschild & Company, Sole Owners
State, Van Buren and Wabash Ave.

Department 16E

CHICAGO, ILL.

Clean Water Power

The PRESTO Vacuum Cleaner uses water power. It takes all the dirt, dust and germs that enter the Cleaner direct to the sewer. The ONLY sanitary process. No fine dust or germs return through bags or screens to the air to be inhaled or to settle. No mess. No valves to clog; no motors to repair. The PRESTO stationary Cleaner obviates the most dangerous and unhealthy act in house-cleaning work: emptying bags and boxes of bacteria-laden dust. Costs less than one-half cent per hour to operate.



"The Water Does the Work—
 the Air Does the Cleaning"

Guaranteed for TEN YEARS. Patents allowed. PRESTO portable Cleaner, complete with 50 feet of one inch vacuum hose, five cleaning tools, ready to connect to bib, only \$30.00. We manufacture both the portable and the stationary systems. Write for full particulars.

PRESTO CLEANER CO.

Office 114-116 Colonnade Bldg.

TOLEDO, O.

Too Much Florida Land Has Been Sold To People Who Have Never Seen It.

Write Brooksville Board of Trade for BOOK OF FACTS, describing different kinds of Florida soil. We have no land to sell but want settlers and investors to develop richest district in Florida, according to State Dept. of Agriculture; not pine land, not sand, but high and rolling with rich dark top soil and clay subsoil. No fertilizer, irrigation or drainage necessary. Raises 80 bu. corn per acre. Best for citrus fruits, truck and staple crops. An industrious man, with \$500 to \$1000 capital, can be independent here. 300 ft. above sea; no swamps or marshes. Ideal climate, schools, churches, towns, good roads, all conveniences. Home seekers and investors please investigate. We need you and will help you.

Board of Trade, Box 267, Brooksville, Fla.



**BOTTOM OF DRESS
 SHIRT BOSOM
 DETACHED**

One of the latest novelties in dress shirts has the bottom of the bosom detached from the body of the shirt. This allows the wearer to bend over or turn himself about without danger of bending or ruffling the shirt front.

BIG 200-p ELECTRICAL and WIRELESS CATALOG Mailed for 4c Stamp

(to cover postage). 60 pages WIRELESS Instruments for commercial and experimental use. 15 pages Motors and Dynamos of all sizes. 35 pages Miniature Trains and Imported Electrical TOYS. 20 pages Telegraph Instruments. 40 pages Electrical Novelties, etc. 30 pages general Electrical Supplies. Get this catalog today—you need it.

J. J. DUCK, 424-6 St. Clair Street, TOLEDO, OHIO

MODEL AEROPLANE SUPPLIES



Engines, $\frac{1}{4}$ H. P. Weight, 4 $\frac{1}{2}$ lbs.—1 H. P. 6 $\frac{1}{2}$ lbs. Very strong, powerful and efficient. Complete line of accessories, ball-bearing propeller shafts. Miniature pneumatic tire wheels.

made in six sizes. Turn buckles, metal fittings, propellers, rattan, bamboo, all six sizes of selected woods, finest grade English Rubber strand, etc. CORRECT PRICES, COMPLETE CATALOGUE SENT ON REQUEST
THE WHITE AEROPLANE COMPANY, 15 Myrtle Avenue, BROOKLYN N. Y.



The Typewriter King of Mexico

Some fifteen years ago, a long, lank Kentucky youth struck out to seek his fortune.

The bicycle fever was at its height and William A. Parker—for that's the name of the "hero" of this little business story—secured a position as agent for one of the large bicycle manufacturers.

His firm sent Parker to the City of Mexico, and he was soon selling bicycles in Spanish at a rate that astonished the natives.

One day an official of the Wells-Fargo Express Company came down to the City of Mexico with an Oliver Typewriter. Parker saw the machine. It was a case of love at first sight. He gave up the bicycle business and secured the Local Agency for The Oliver Typewriter.

Parker started out to convert a nation to a machine that up to that time had scarcely been heard of in Mexico.

It was a stupendous job and meant years of striving against overwhelming odds.

To make a long story short, William A. Parker is today the Typewriter King of Mexico. He controls the sale of The Oliver Typewriter in the entire republic.

He has many branch offices, heads an army of agents, and the Mexican Government reports show that more Oliver Typewriters are imported into Mexico every year than all other makes of typewriters combined.

Mr. Parker is an important figure in Mexican commercial affairs, stands high with the Government, and is rapidly accumulating the fortune he started out to seek.



You can be the Typewriter King in YOUR Community!

What would you give to hold an Exclusive Agency Contract, direct from The Oliver Typewriter Company—a document giving you absolute control of all sales of The New Oliver Typewriter—the latest model—the great No. 5—in your community during the entire life of the arrangement?

—The same scepter of power that has enabled Wm. A. Parker to dominate the typewriter situation in Mexico.

—A Contract that carries with it attractive possibilities of Profit and the personal Prestige that comes from being actively associated with one of the foremost industries of modern times. We offer to one man in every city, town and village—THE MAN OF MASTERFUL PURPOSE—this remarkable business opportunity.

A Public-Utility Franchise

The typewriter is today a recognized Public Utility, ranking in commercial importance with those twin agencies of civilization, the *Telegraph* and the *Telephone*. Millions are spent annually for typewriters.

Think of being able to secure for yourself a Franchise giving you the Exclusive Control in your locality of one of the greatest Public Utilities, so that every new Oliver Typewriter sold therein pays profit-tribute to you!

The OLIVER Typewriter

The Standard Visible Writer

The Local Agency for The Oliver Typewriter admits you to an International Sales Organization that is widely famed for the wonderful sales records it has made.

No Limits Set to Earnings

We ask for loyal service, yet demand no more of your time than you choose to give to the work. Whether you work one hour or ten hours a day, is left to your own discretion. The rewards are in direct proportion to the time and effort expended. We set no limit on your earnings.

The Famous "17 Cents a Day" Plan

This plan sweeps aside the objection—"I can't afford The Oliver Typewriter." The Local Agent is authorized to sell The Oliver Typewriter for 17 Cents a Day! He collects and sends in the small first payment, then we attend to the details.

The liberality and convenience of the Penny Purchase Plan is adding thousands to the list of Oliver Typewriter owners.

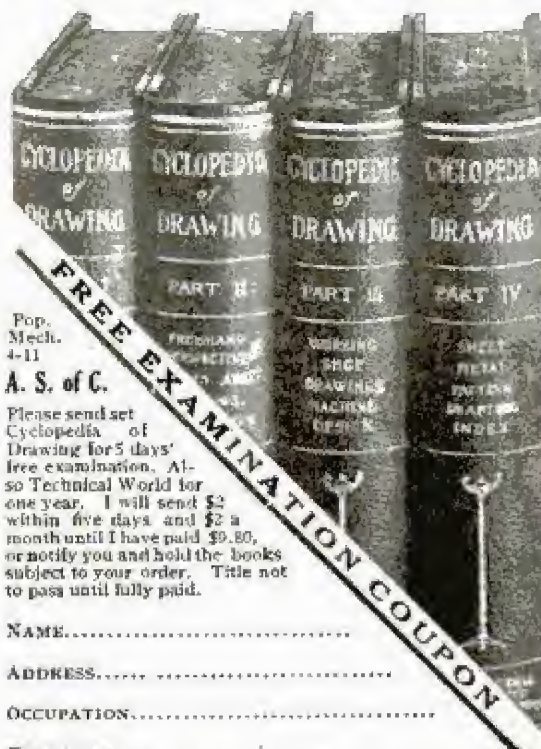
Promptness Wins! Write at Once

Wherever you live and whatever your present work, this proposition should command your immediate attention. Prompt, decisive action wins the prize. The mail is none too fast to speed your application for the Agency. We do not pay telegraph tolls on messages of inquiry, but if you are intensely interested in securing the agency for your locality, you will not hesitate to use the wires for a prepaid telegram.

Write for "Opportunity Book" and full information without delay.

Address Agency Department

The Oliver Typewriter Co. 269 Oliver Typewriter Building, CHICAGO



Pop.
Mech.
4-11

A. S. of C.

Please send set of Cyclopedia of Drawing for 5 days' free examination. Also Technical World for one year. I will send \$2 within five days and \$2 a month until I have paid \$9.80, or notify you and hold the books subject to your order. Title not to pass until fully paid.

NAME.....

ADDRESS.....

OCCUPATION.....

EMPLOYER.....

Cyclopedia of Drawing

This four volume Cyclopedia embodies two thousand 7x10 inch pages of the most complete and detailed information ever published on drawing.

Information is contained in this Cyclopedia that heretofore could be found only in private libraries and the most expensive reference books. Not only Drafting, but also Designing in all branches of Sheet Metal Work is treated thoroughly. Special attention is given to construction of Skylights, Cornices, Roofing, etc., besides detailed instruction in drawing, architectural designing, working drawings, lettering and blue printing.

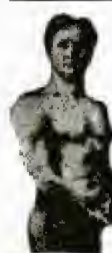
To make the books doubly valuable to the practical workman, we have added 1,500 full page plates, drawings, diagrams, tables, formulas, etc. and every section is supplemented with a series of practical test questions.

EXAMINE THE BOOKS AT OUR EXPENSE

The entire set of four volumes will be sent you absolutely free for 5 days' examination upon receipt of the coupon. Examine the books carefully—subject them to every possible test, and if you do not find them the best, most clearly written books on drawing, notify us to send for them. We pay all express charges.

If, after examination, you agree with us that the books will form a most valuable addition to your library, and you decide to keep them, send \$2.00 and \$2.00 every month thereafter until you have paid the introductory price of \$9.80. The regular list price is \$20.00. Mail the coupon now.

American School of Correspondence, Chicago, U. S. A.



I will send as long as they last my 25 Cent Book

STRONG ARMS

For 10c in stamps or coin

Illustrated with 20 full page halftone cuts, showing exercises that will quickly develop, beautify, and gain great strength in your shoulders, arms, and hands without any apparatus.

PROF. ANTHONY BARKER

641 Barker Bldg., 110 W. 42d Street, New York



Perfex Suction Cleaner

The most perfect made. Can use motor for washing, etc. Tools complete—guaranteed. Also hand and stationary machines.

AGENTS WANTED

PERFEX CLEANER CO.

WAUKEGAN, ILL.



\$6.00 Per Day

That's what Mr. W. M. Thomas of Hull, Ga., says he averages; and that isn't the most they make by any means. Isn't that reason enough why you should go into the photo button business? The

Wonder Cannon Camera

is the biggest money maker to-day. A sure money getter at all outdoor festivals and wherever the crowds assemble. Anyone can learn the business in 30 minutes.

\$2500 Buys a Complete Outfit—**WONDER CANNON CAMERA**

—tripped and enough supplies to make 400 finished photo buttons. (Gift frames, \$1.10 to \$1.75 per gross, 5000 Percent Profits.)

Write Today for **FREE CATALOGUE**

CHICAGO FERROTYPE CO., Dept. 102, CHICAGO, ILL.

TAGGING SHIPS OF THE AIR—In the infancy of navigation it was found essential that every ship that sailed the sea should have a home and possess its papers to prove its identity and ownership. Those vessels that could produce no sea letters or ship's papers were treated as pirates or presumed to be engaged upon no lawful business.

That was the first stage in the law of the sea. It stands to reason, and it will involve no hardship to insist, even in the infancy of aerial navigation, that there must be some similar registration to that in use as to vessels. Each aeroplane must have a domicile or home port; its captain must, when he comes to ground, be able if required, to produce his papers.

The roving, homeless aeronaut who has no credentials must be viewed as a sort of pirate of the skies.—London Times.

CACHOO! Make the whole family and all your friends "just sneeze their heads off" without knowing why, with **CACHOO**, the new long distance harmless snuff. Sent anywhere for 10c. 3 for 25c. 90c a dozen. Catalog included **FREE**. P. T. & N. CO., Department B, Chicago, Ill.



GREAT FREE BOOK
"How to Learn to Mount Birds and Animals"



Mount Birds and Animals.

SPORTSMEN! Fishermen! Hunters! Naturalists!

The wonderful profession of Taxidermy, so long kept secret, can now be easily learned right in your own home.

We Teach by Mail how to

mount Birds, Animals, Game Heads, tax skins, make rugs, and preserve all trophies. A delightful and fascinating art for men and women. Easily and quickly learned during spare time. Decorate home and den with fine trophies, or command big income selling mounted specimens and mounting for others. Skilled Taxidermists in great demand. Success guaranteed or no tuition fee. Endorsed by thousands of satisfied graduates. Write today for our Great Free Book "How to Learn to Mount Birds and Animals." Also our beautiful Taxidermy Magazine. **BOTH FREE.** Write today—do it now.

The N. W. SCHOOL OF TAXIDERMY, Inc.

1194 Elwood Bldg., Omaha, Neb.

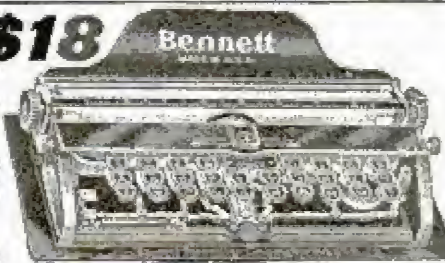
A Perfect Portable Typewriter for \$18

The **Bennett Portable** is the handiest typewriter in existence. Weighs but 4½ lbs. and slips into your grip or pocket, ready to turn out neat work on train, at hotels or anywhere. High grade construction; made by experts in the Elliott-Fisher Billing Machine Factory. Guaranteed fully. Standard keyboard, 84 Characters. Low priced because simply made of few parts.

Put the Bennett to a 10 Day Practical Test

You can be business-like in your correspondence no matter where you are. Let us send you catalog, samples of work and our 10 day free trial offer. Send us your request today.

P. D. Bennett Typewriter Co., 386 Broadway, New York, N. Y.





Put Yourself in His Place

THIS man inside the fire lines is watching his property burn. What does it mean to him? What would it mean to you if you were in his place? Would you be face to face with disaster or would you watch the smouldering remnants of your property with your mind occupied with plans for business rehabilitation, because somewhere in the ruins is the safe containing the indestructible financial soul of your business—your fire insurance policy?

If this happens to your property, you can plan with absolute certainty if your policy is in the **Hartford**, because for more than a hundred years it has been furnishing just this kind of business protection and has never failed to make good an honest loss.

It has paid 140 Millions for claims on property of its policy holders. This is larger indemnity than has ever been paid by any other American company.



When Next You Insure
Insist on the Hartford



**BUY
AT
Wholesale
Prices**

**FROM
THIS Big Catalogue**

By our system of giving New York wholesale prices and paying the freight on most of the goods we sell, we save you 30 to 40 per cent. on every purchase.

Bear in mind that we supply everything needed about the home, farm or factory. After you once have our catalogue of 75,000 articles, you need not go out of the house to buy most of the articles you need.

Our goods are all reliable and we guarantee satisfaction or money back.

Our customers are all over the world. They are satisfied because we give a square deal and save them money. We want their trade not only for to-day, but next year, and for years to come.

We have been in business since 1816 and a great many of our customers have been buying from us for a generation. Doesn't that record invite your confidence and your trade?

Get our catalogue and send us a trial order. We know that the quality, the low prices, and the Free Delivery will hold you as a customer ever after.

If it's Sugar you want or Harness—Clothing or Tools—we can supply you.

Just drop a postal card for the catalogue—it's free—you ought not to be without it.

**WHITE, VAN GLAHN & CO., 30 Barclay St.
NEW YORK CITY**

Oldest Mail Order House
in America. Est. 1816



**YOU CAN SAVE
50 PER CENT**

by buying our belting. We sell new and used, carry five to 10,000 feet of all sizes in stock.

You can increase the wear of your belting 50 per cent by having us take out the oil and grease and repair same. Noxall Belt Dressing, which we manufacture, preserves the life of any belting. A joint made with Trojan Belt Lacing of which we are the sole manufacturers lasts twice as long as any other lacing. To prove this statement address

**The Leather Preserver Mfg. Co.
512 W. Monroe St., Chicago, Ill.**



Grow Mushrooms

**For Big and Quick Profits
Small Capital to Start A Sale Business**

I am the largest grower in America. Ten years experience enables me to give practical instruction in the business worth many dollars to you.


No matter what your occupation is or where you are located, here is an opportunity to acquire a thorough knowledge of this paying business.

Send for Free Book giving particulars and information, how to start, cost, etc. Address

**JACKSON MUSHROOM FARM
6069 N. Western Ave., Chicago, Illinois**

HOW'D YOU LIKE A PAPER TOOTH? One of the oddest uses to which paper has been put is that which has resulted in the manufacture in Germany of artificial teeth. They are said to retain their color well, and are less likely to chip than ordinary false teeth. When the wine growers of Greece were badly off for wood with which to construct their casks, they used paper to make barrels.

Out of the sheets of an Austrian paper an ingenious engineer constructed for his own use a small yacht 20 ft. long. In the construction of the hull, deck, masts, sails and rudders several thousand copies of the



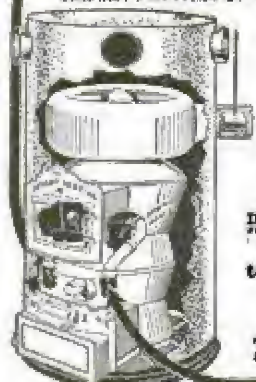
Every Boy His Own Toymaker

Greatest boys' book ever written. Tells how to make a Steam Engine, Microscope, an Electric Telegraph, Telephone, Magic Lantern, Boats, kites, balloons, electrical and mechanical toys, traps, fishing tackle. 200 illustrations. Price only 10c postpaid, 3 for 25c. Western Puzzle Co., St. Paul, Minn.

FOOT AGONY Instantaneous relief for callous, or tender spots on soles. No chemicals. A mechanical device. Material and instructions mailed, 50 cents. Coin, or stamps. **C. H. FLATT & CO. 118 Market Street, NEWARK, N. J.**

Buy Direct—Save Money—We Pay Freight

Our monthly installment plan of selling direct saves you the dealer's profit and his excessive charges for installation and repairs. You can save at least 1/3 the cost of your furnace. We have been building Jahant Furnaces for over 30 years and guarantee satisfaction.



JAHANT DOWN DRAFT FURNACE

THE BEST HEATING SYSTEM MADE for residences, schools, hotels, churches, etc. It is the most economical furnace too and saves 1/4 to 1/2 the cost of fuel because the patented "Down-Draft System" burns wood, hard or soft coal, and burns it ALL without clinders, clinkers or any waste. Needs less attention, yet heats much better than any other furnace, hot air, steam or hot water heating system. Our plan of monthly payments

ONLY \$10 DOWN and \$10 A MONTH

makes it easy for any one to have the best heating system made. Every Jahant Furnace is sold with a strong "Guaranty Bond" that allows you 365 DAYS TRIAL. You don't run any risk buying from us.

We send complete outfit, furnace, pipes, registers, etc., together with special plans, full directions and all tools for installing. If you can drive a nail you can install a Jahant Furnace without the aid of a tinner.

Write To-Day for Catalog

THE JAHANT HEATING CO.,

which explains the Jahant Down-Draft System and tells why it gives more heat at less cost.

3 Mill Street, Akron, O.

Have the Earliest and Finest Sweet Peas

In Your
Town

Also insure early picking of better garden beans and peas than you have ever grown. These are the results of using—

FARMOGERM

High-Bred Nitrogen Gathering Bacteria

Just mix with water and moisten seed or sprinkle over rows. The bacteria increase by millions. Quicker, harder, and larger growth follows because the bacteria furnish the nitrates needed. These and some other crops MUST be inoculated to thrive best. Ask any expert. See our reports from users. Farmogerm comes in small, specially sealed bottles READY FOR USE. Sold by leading seed houses or sent by mail or express paid.

GARDEN SIZE, 50c ACRE SIZE, \$2.00

Hardy Lawns are started by mixing in some inoculated white clover seed. Our Free Book No. 1 gives full particulars and proofs. Write today. It will enable you to break all records this year.

EARP-THOMAS FARMOGERM CO., Bloomfield, N. J.



150 MAGIC TRICKS

64 page book illustrating these easy sleight of hand passes—only 10c.

WESTERN PUZZLE WORKS, ST. PAUL, MINN.



PRINT FOR YOURSELF

Cards, circulars, book, newspaper. Press \$5. Larger \$18. Rotary \$60. Save money. Print for others big profit. All easy rules sent. Write factory for press catalog, TYPE, cards, paper.

THE PRESS CO., Meriden, Connecticut

journal were used. Each plank required 2,500 leaves, and enormous pressure was used to procure the necessary solidity. Several countries have experimented with a view to utilizing paper for the paving of roads and streets; but the cost was prohibitive.—St. Louis Globe Democrat.

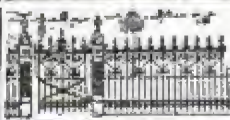


HOW TO ENTERTAIN

Book with 250 Jokes and Riddles, 73 Toasts, 67 Parlor Tricks, 8 Fortune-Telling Secrets, 52 Money-Making Secrets, 22 Funny Readings. All 10c Postpaid.

J. C. DORN, 417 Dearborn St., Dept. 26, CHICAGO, ILL.

Make money in spare time



Selling Stewarts Iron Fence. Vases, Settees, etc. Liberal proposition to right persons.

THE STEWART IRON WORKS CO., Cincinnati, Ohio

169 Page Catalog FREE.

NO MORE BALD HEADS



When our VACUUM CAP is used a few minutes daily. We accept no pay until you have tried the Cap 60 days and are satisfied. The Vacuum Cap is an appliance that draws the blood to the Hair Roots and starts a new healthy crop of hair. It stops Dandruff, stops the hair from falling out. Bought by Doctors and men who

know that it is the only reasonable HAIR GROWER known to science. No Drugs Used. Write for application blank, testimonials, and booklet on "HAIR," sent sealed in plain envelope, FREE.

THE MODERN VACUUM CAP CO.

P. 559 BARCLAY, DENVER, COLO.



Would You Pay \$2 a Month for a Better Salary?

—for a chance to show what you're REALLY WORTH. Would you pay \$2 a month for the difference between failure and real achievement, between a common job and a BIG SUCCESS?

Then Sign the Coupon

Some Important Subjects Covered

Handling Men
Figuring Costs
Strength of Floors
Strength of Walls
Strength of Beams
Roof Trusses
Roof Coverings
Ventilation
Steel Construction
Masonry
Plane Surveying
Mechanical
Drawing
Railroad
Engineering
Building
Roadbeds
Tunnel Construction
Railroad Finance
Bridge Building
River and Harbor Improvements
Wind Pressure
and Snow Loads
House Drainage
and Sanitation
Cement and Concrete Building
Water Power and Water Supply
Irrigation
Engineering
Handling Power of Locomotives
Highway Construction

on this page—sign it without obligating yourself to spend one penny—and let us send you a work that will give you that vitally important knowledge of practical affairs that COMMANDS a good salary wherever you are; a work that every railroad employee, every man, in the engineering and construction departments of every industrial enterprise, every foreman, and superintendent in mill and factory, should carefully read and study.

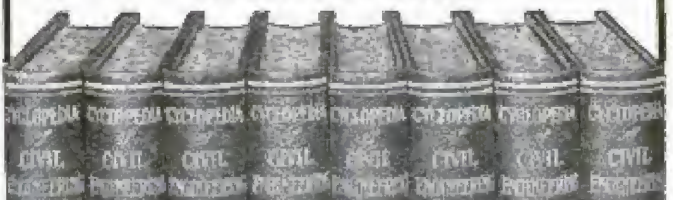
The Cyclopedia of Civil Engineering

is not a collection of theories, but the actual, crystallized, tried and tested experience of the greatest railroad and industrial engineers. It is not a dictionary of disjointed facts, not a dry and technical work, but a clear and simple exposition of every phase of practical engineering. For these eight volumes teach the handling of men as well as the strength of stone and steel; they describe modern feats of irrigation as well as the building of mills and factories; the latest triumphs of cement and concrete construction as well as the laying of tracks of steel over mountain and plain. These eight meaty volumes are handsomely bound in half Morocco and contain 3908 pages, with over 3000 illustrations, folding maps, diagrams, etc.

We want you to at least SEE these books. We want YOU to judge their worth. We want to send them to you at OUR risk, for you to examine at your leisure, and then if you don't believe them to be ACTUALLY WORTH TWICE THE INTRODUCTORY PRICE WE ASK, if you don't believe them to be worth to YOU IN COLD DOLLARS AND CENTS TWELVE TIMES \$2.00 a month, then simply send them back within five days at OUR expense AND THE TRANSACTION WON'T COST YOU ONE PENNY.

For a short time we will include as a monthly supplement, for one year, the TECHNICAL WORLD MAGAZINE. This is a regular \$1.50 monthly, full of Twentieth Century Scientific Facts, written in popular form.

American School of Correspondence CHICAGO, U. S. A.



FREE OFFER COUPON

AMERICAN SCHOOL OF CORRESPONDENCE: Pop. Mech. 4-11
Please send set of Cyclopedia of Civil Engineering for 5 days' FREE examination, also Technical World for 1 year. I will send \$3 within 5 days and \$2 a month until I have paid \$24.00, otherwise I will notify you and hold the books subject to your order. Title not to pass until fully paid.

NAME

ADDRESS

EMPLOYER

OCCUPATION

Please Mention Popular Mechanics

→ **Protect Your Idea!** ←

PATENTS THAT PAY

"My Trade-Mark"

Special Offer:

Mr. Inventor: I invite you to come to see me, and bring, (or send by registered mail), sketches or photograph or model and description of your idea or invention for FREE examination of U. S. PATENT OFFICE Records and report as to patentability of the same;—to find out as to whether you are entitled to a patent will not cost anything;—then, if your invention is new, upon receiving instructions, I will prepare ALL necessary (application) papers.

DO THIS AND SAVE TIME AND MONEY!

WRITE NOW!

Highest References:

Lincoln National Bank,
Washington, D. C.

NOTE: When writing these clients send two-cent stamp for reply.

Little Giant Hay Press Co.,
Alma, Mich. and
Dallas, Texas.

Gray Lithograph Co.,
New York City, N. Y.

Farmers Mfg. Co.,
Norfolk, Va.

New Era Mfg. Co.,
Fairfield, Iowa.

Bernhard Furst,
Vienna,
I. Austria-Hungary.

Otto von Rottenburg,
Schwindstrasse 20,
Frankfort a/M,
Germany.

H. A. Fonseca,
Rua Dos Ourives 20,
Sobrado, Rio de Janeiro,
Brazil, S. A.

A. J. Corsi,
Irish Town,
Gibraltar.

Bell Show Print Co.,
Sigourney, Ia.

The Camp Conduit Co.,
Cleveland, O.

The Iowa Mfg. Co.,
Oskaloosa, Ia.

Sam'l Allen & Son Mfg. Co.,
Danville, N. Y.

The Garl Electric Co.,
Akron, O.

Superior Mfg. Co.,
Sidney, O.

Tidnam Tel. Pole Co.,
Oklahoma City, Okla.

Edw. H. Smith,
Aberdeen, Wash.

C. O. Cracroft,
Cordova, Alaska.

V. C. de Ybarrondo,
Los Angeles, Cal.

Wm. H. Garlock,
Leland Hotel,
Seattle, Wash.

F. Rutherford,
Copper Queen Con. Min. Co.,
Douglas, Arizona.

Gas Range & Heater Co.,
S. Pasadena, Cal.

Newberg Brick & Tile Co.,
Portland, Ore.

INFRINGEMENT, VALIDITY AND INTERFERENCE WORK SOLICITED

I am admitted to practice before the United States Supreme Court and others

"I want to thank you for the most excellent services you have rendered me in this suit [B. Williams vs. Central Drug Co., U. S. C. C., Northern District of Illinois—E. Div.], and assure you that I appreciate it very much, and if at any time I can secure some business for you, I will be only too glad to do so."

(Signed) J. THOMPSON, Mgr. Central Drug Co., Sioux City, Iowa.

Other Important Suits Successfully Settled

FREE: Two Books—61-page "Inventor's Guide" and 64-page "Proof of Fortunes in Patents—What and How to Invent"

Foreign Patents a Specialty

If you have a U. S. application write me for excellent literature and terms for promoting your Foreign Patents. Liberal discounts.

I Advertise My Clients' Patents Free

In a publication having over 2,000,000 circulation. Write for Special Offer. Successful clients in every section of the U. S.

COMPARE MY LOCATION WITH OTHERS

MINE IS THE BEST

E. E. VROOMAN



My Office and the Patent Office
(I give you proof of my location)

Across the street from the U. S. Patent Office

Expert—Prompt Services

E. E. VROOMAN, Patent Lawyer Wash., D.C.

Registered Patent Attorney. Patent Litigation

High-Class Work—Excellent Testimonials

871 F Street, N. W.

\$217,440.00 \$
MADE BY MY CLIENTS \$

YOU Should Have My FREE BOOK

Telling HOW OTHERS will do the same IN THE FUTURE. "WHAT and HOW to INVENT" BOOK FREE!

"I received ONE HUNDRED DOLLARS (\$100.00) down (in re my Can Righting Machine Inventions) and in thirty days NINE HUNDRED DOLLARS (\$900.00), and when my patents are issued ONE THOUSAND DOLLARS (\$1000.00) more. I can conscientiously state to my fellow inventor that he will do the right thing by placing his patent business in Mr. Vrooman's hands for the best iron-clad patents."

(Signed) WILLIAM C. BRIDGES, Wapello, Iowa.



MR. H. ELLIS CHANDLEE

PATENT

WHAT YOU INVENT!

PATENT

YOUR IDEAS MAY BRING YOU A FORTUNE

There is A Constant Demand For Good Inventions.

One of our clients recently made \$85,000; another \$7,000; another \$5,000; another \$3,400; two others \$1,000 each, and two others \$500.

WRITE FOR

"OPPORTUNITY"

A List of Needed Inventions

Also, "U. S. LETTERS PATENT," telling how to obtain a patent.
"THOUGHTS THAT HAVE PAID," a history of successful inventions.
"TESTIMONY," giving our testimonial letters from manufacturers and inventors.

Mailed free to any interested person

IF YOU HAVE AN INVENTION send us a rough sketch and description, model or photograph of it, and we will give you our opinion as to its patentability **WITHOUT CHARGE**. If our opinion is favorable, we will issue a contract binding us to **refund every cent** of our fee if we fail to obtain a patent.

This assures you that we will not make application unless the chances of success are good, and that **every effort** will be made to obtain an allowance. We advertise the patents of Our Clients for sale in prominent dailies free of charge.

"Prompt and Proper Service"

H. Ellis Chandlee & Co.

Suite 55, Bornot Building, WASHINGTON, D. C.

PATENTS TRADEMARKS AND COPYRIGHTS SECURED OR FEE RETURNED

SPECIAL OFFER — FREE SEARCH OF PATENT OFFICE RECORDS

Send us a model, photograph or sketch and description of your invention, and we will make a *Free Search of the Patent Office Records* to ascertain if it is patentable. If we report the invention patentable, we will guarantee to obtain a patent or return our fee, and furnish a certificate of patentability backed by a bonded contract to that effect.

This Certificate of Patentability will protect the inventor and serve as proof of the invention until the case can be filed in the U. S. Patent Office.

OBTAINING ASSISTANCE FOR INVENTORS

Our certificate is of great assistance to inventors who require financial aid to obtain patents. It is useless to attempt to interest capital unless evidence is furnished that the invention is patentable. Our certificate gives this necessary assurance.

OUR FOUR BOOKS MAILED FREE

to any address. Send for these books—the finest publications ever issued for free distribution.

HOW TO OBTAIN A PATENT

Our illustrated eighty-page Guide Book is an invaluable book of reference for inventors, and contains 100 mechanical movements illustrated and described.

FORTUNES IN PATENTS

Tells how to invent for profit, and gives history of successful inventions.

WHAT TO INVENT

Contains a valuable LIST OF INVENTIONS WANTED and suggestions concerning profitable fields of invention; also information regarding prizes offered for inventions, among which is

PRIZE OF ONE MILLION DOLLARS

offered for one invention, and \$10,000 for others.

PATENTS THAT PAY

Contains fac-similes of unsolicited letters from our clients who have built up profitable enterprises founded upon patents procured by us; also indorsements from prominent inventors, manufacturers, Senators, Congressmen, Governors, etc.

VICTOR BUILDING

Our new \$150,000 building, opposite the U. S. Patent Office, specially erected by us for our own use, designed and equipped with all modern appliances for our patent business.

WE ADVERTISE OUR CLIENTS' INVENTIONS FREE

in a list of Sunday newspapers with two million circulation, in manufacturers' journals and in the *World's Progress*. Sample Copy Free. We also send a LIST OF PATENT BUYERS. We not only save you time and money in securing patents, but obtain patents which PROTECT the invention and PAY. After the patent is granted we assist you TO SELL YOUR PATENT.

FOREIGN PATENTS

WE HAVE DIRECT AGENCIES IN ALL THE PRINCIPAL FOREIGN COUNTRIES and can secure FOREIGN PATENTS in the shortest possible TIME and at the LOWEST COST. We GUARANTEE TO SECURE THE FOREIGN PATENTS OR RETURN OUR FEES. Write for our Illustrated Guide Book on Foreign Patents, sent free to any address.

REFERENCES:

Second National Bank, Washington, D. C.
R. G. Dun & Co., Washington, D. C.
National Savings and Trust Co., Washington, D. C.
Smethport Glass Co., Smethport, Pa.
Schrade Cutlery Co., Walden, N. Y.
Clum & Atkinson, Brass Founders, Rochester, N. Y.
Rochester Rotary Pump Co., Rochester, N. Y.
Lawrence Mills, Mfrs. Bed Spreads, 51 Brooke Ave., Englewood, N. J.
The Melvin Gauge and Signal Inst. Co., Scranton, Pa.
Damon Mfg. Co., Mfrs. "Missing Link" Flour Mill Disintegrators, Bowling Green, Ky.
Modern Canner Co., Mfrs. Canning Machinery and Canners' Supplies, Bridgeport, Ala.
M. Winter Lumber Co., Sheboygan, Wis.

C. K. Lassiter, Mechanical Engineer, Schenectady, N. Y.
Pitner Gasoline Lighting Co., Chicago, Ill.
Sprout, Wardon & Co., Mfrs. of the Monarch Feed Governor, Muncy, Pa.
The L. B. Dozier Co., Mfrs. of Plumbing, Heating and Machinery Supplies, Columbia, S. C.
B. B. Earnshaw & Bro., Mfrs. "Cream Blend" Flour, Washington, D. C.
A. L. Schultz, Consulting Engineer, Pittsburgh, Pa.
Arthur H. Swan & Co., Mfrs. of Peel-Blade Tips, 279 Warren St., Roxbury, Pa.
The H. W. Moore Piano Truck Co., Anderson, Ind.
The Culver Novelty Co., Mfrs. of Carbureters and Mixers, Culver, Ind.

VICTOR J. EVANS & CO.,
(Formerly EVANS, WILKENS & CO.)

Opposite United States Patent Office

VICTOR BUILDING
724-726 9th St., N. W.

WASHINGTON, D. C.

WANTED-IDEAS

The largest
and best known manufacturers and
buyers of patents in the world want ideas protected
through me. Send for my literature and read their letters.

Free

New 72-page guide book "Successful Patents" (tells how to proceed in order to be successful); book "Stepping Stones" (contains list of over 200 inventions wanted); "How and Why I Will Make You Succeed" (with list of recent successes) sent free on request. Highest references. Free manufacturing facilities. Clients' patents sold free. **FEES RETURNED IF NOT SUCCESSFUL.**

SPECIAL: Send sketch or model of invention for free report. No obligation incurred by writing me.

RICHARD B. OWEN, Dept. 9, WASHINGTON, D. C.



PATENT YOUR IDEAS

\$100,000 for one invention; another \$8,500. Book "How to Obtain a Patent" and "What to Invent" sent free. Send rough sketch for free report as to patentability. We advertise your patent for sale at our expense.

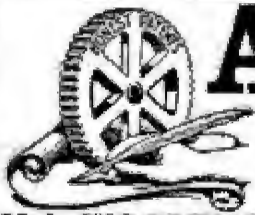
PATENT OBTAINED OR FEE RETURNED.

CHANDLEE & CHANDLEE, Patent Atty's

1044 F. Street

WASHINGTON, D. C.

PATENTS: For facts about Prize and Reward offers and Inventions that will bring from \$5000 to 10 Million Dollars; and for books of Intense Interest to Inventors, send 8c postage to R. S. & A. B. LACEY, Div. 45 Washington, D. C. - Estab. 1869



A Talk to the Inventor

If there is any basis for an application in your idea, I can find it. But I will explain it to you before filing your application. Copies of Nearest Patents, and Report, in Every Case I have patented inventions reported unpatentable elsewhere.

Send for
**FREE
BOOK**

**What You Should Know
What to Invent
What NOT to Invent
How to Sell Your Patent**

H. L. WOODWARD, N. W. Cor. 9th and G Sts., Opposite Patent Office, WASHINGTON, D. C.

ENGLAND'S MILITARY RAILWAY—The South-western is our most important military line. It skirts the Channel, and has more military stations on it than any other. It connects the three great naval stations, Portsmouth, Portland and Plymouth, with the two great camps, and serves as many garrison towns as it does cathedral cities. The road it jointly owns with the Brighton into Portsmouth is the only one in the country that passes through a rampart. And, owing to the concentration of the troopships at Southampton, it carries every British soldier that goes or returns on foreign service. —Westminster Gazette.

Our 50th Anniversary PATENT and Trade-Mark Lawyers

We have served faithfully Thousands of Responsible Inventors. If YOU want the real Truth about Patents write US. Booklet of valuable facts free.
MASON, FENWICK & LAWRENCE, 613 F St., WASHINGTON, D. C.

LANGDON MOORE

Counselor-at-Law and Patent Attorney

**Patents, Trade-Marks
Designs and Copyrights**

9th and F Streets, WASHINGTON, D. C.

Formerly Examiner U. S. Patent Office

SEND FOR BOOKLET

A. Patent of Quality

is the only kind that will protect your invention and make it salable. You need my free advisory information. Send for it.

GEO. R. HAMLIN, Patent Lawyer

801-8th Street, N. W.

WASHINGTON, D. C.

PATENTS THAT PROTECT and PAY

Advice free. Terms reasonable. Highest references. Best results.
Send sketch or model for FREE examination and opinion.

Recommended Patent Lawyer in the Bankers' Register and special list of selected lawyers. Also in Martindale's Law Directory, Sharp and Alleman's Directory of Lawyers, The Gast-Paul Directory of Lawyers, and Kime's International Law Directory.

ALL BUSINESS GIVEN PROMPT AND PROPER ATTENTION

A large list of strong recommendations furnished free

WATSON E. COLEMAN, Patent Lawyer, 622 F St., N. W., Washington, D. C.

Patents \$55

EIGHT MONTHS TO PAY
FIRST PAYMENT ONLY \$5

Send me a rough sketch, small model or other description of your invention by return mail and I will send you a free report as to its patentable nature.

REJECTED CASES MY SPECIALTY

I am the only attorney making a specialty of procuring patents in cases rejected by the Patent Office. If I report such a case patentable, I will procure the allowance of patent, or make no charge for my service. Send for my references and testimonials; they cannot be equaled.

Book on Patents and full particulars free.

ALEXANDER J. WEDDERBURN, JR.

Registered Patent Attorney
WASHINGTON, D. C.

Branch Offices — New York, Chicago, Boston, Philadelphia, Pittsburg and Cincinnati

PATENT

SECURED OR
FEE RETURNED

Free expert search of official records. Send for free handbook.

MILO B. STEVENS & CO., Attorneys

ESTABLISHED 1864

685 F. St., WASHINGTON D. C. 370 Monadnock Bldg., CHICAGO

Guaranteed and recommended by the Bankers' Register. Highest rating by Martindale's American Law Directory.

PATENTS

C. L. PARKER
Ex-Examiner U. S. Patent Office
PATENT LAWYER
210 MCGILL BLDG.
WASHINGTON, D. C.

Patents, Trade Marks, Copyrights, Patent Litigation

Handbook for Inventors, "Protecting, Exploiting and Selling Inventions" sent free upon request.

Do You Need A Gear



of any description for any purpose? We carry practically all the standard sizes in stock ready for immediate shipment.

We make gears of any style, size or material to order—promptly.

Our new free catalogue contains tables and rules for figuring both spur and bevel gears.

Grant's "Treatise on GEARS"—Price \$1.00 is a valuable reference book for the student and designer.

Philadelphia GEAR Works, Inc.

1120 Vine Street GEO. B. GRANT, PRES. Philadelphia, Pa.

"MILL TO MAN" \$13.50

TAILOR-MADE SUITS

Spring and Summer, 1911

Save from \$5 to \$20.

WE DYE THE YARNS, WEAVE THE CLOTH AND TAILOR TO YOUR MEASURE.

We are the famous "Loom to Leg" Mills. You get a suit at from \$13.50 to \$23.75 for \$20 to \$40 value. This means tailor-made suits at prices you willingly pay for ready-made suits. Our patterns embrace the latest weaves in gray, brown and blue; also the beautiful pencil stripe effects. Best linings, French haircloth and linen canvas. We guarantee garments to hold their shape. New York styles without extremes or freaks. Complete satisfaction absolutely guaranteed. Express prepaid. Write for catalogue self-measurement instructions and samples.

COLONIAL WOOLEN MILLS

DEPT. 203 LAWRENCE, MASS.



PATENTS

NEW AND EASY PLAN OF MAKING PAYMENTS


Valuable Book Free

Illustrates and describes 100 Mechanical Movements and contains useful information for inventors. MAILED FREE.

CHAS. E. BROCK, Patent Attorney

(Twenty-five years' experience)

918 F. STREET WASHINGTON, D. C.



DON'T DISCARD
BROKEN PARTS

Have them welded together by the Oxy-Acetylene Process. Steel, Cast Iron, Bronze, Copper, Aluminum and all other metals can be welded. Manufacturing quoted on. Welding equipments for repair shops or large plants supplied.

DAVIS BOURNONVILLE CO.

105 West Street NEW YORK, N. Y.

BIG BEN'S ACCURACY—The Big Ben clock is perhaps the most perfect timekeeper in the world. When it was under construction rather more than half a century ago, the then Astronomer Royal (Sir George Airy), who was consulted regarding its mechanism, declared that it was impossible to design a clock subject to big ranges of temperature and other external causes of error that would keep time within four or five seconds. The late Lord Grimthorpe (then Mr. E. Beckett-Denison), however, who was a famous horologist, thought otherwise, and he designed specially for the Westminster clock his gravity escapement to which it owes its marvelous good going.

An electrical signal is automatically sent by Big Ben once a day to Greenwich.—London Daily News.

Let Us Do Your Manufacturing

Buying material in large quantities and having a modern factory equipped with the latest machinery enable us to make almost anything in metal or wood at a very low price. Estimates free. We have a complete model and pattern department.

TINLEY PARK MFG. CO., 14 State Street, CHICAGO

INVENTORS

Our Brain Belongs to You. Our Ideas Are Free of Charge.

All we want in return is to build your model, special machinery, dies, tools and rigs to manufacture sheet metal goods, etc. We are expert mechanics, over thirty years experience, and have one of the best-equipped shops in the country. Ask for Booklet No. 12. Consultation free. Experimental work strictly confidential.

A. NACKE & SON

236-242 S. 9th St., Philadelphia, Pa.



Active Powers of Inventive Genius

LOFTIS SYSTEM Diamonds on Credit

Write for our handsome 100-page Catalog, containing over 2,000 illustrations of Diamonds, Watches, Artistic Jewelry, Silverware, Novelties. Let us send you a fine Diamond or Watch on approval, all charges prepaid. If satisfactory, keep it and send us one-fifth of the price, balance in eight equal monthly amounts. Bargains in ladies' and men's Watches. We give better values and better terms than any house in America.

LOFTIS

THE OLD RELIABLE ORIGINAL DIAMOND AND WATCH CREDIT HOUSE

Write Today Don't Delay

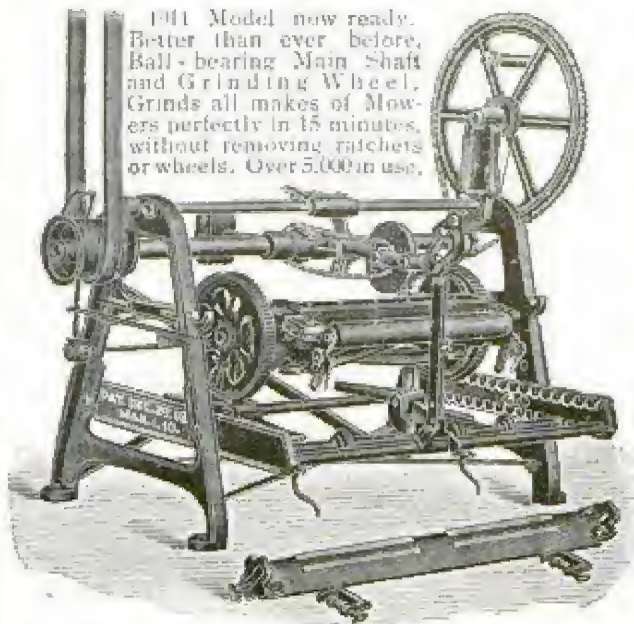
Dept. D 173, 92 to 98 State St., CHICAGO, ILL.

BROS & CO. 1733

Branches: Pittsburg, Pa.; St. Louis, Mo.

"IDEAL" LAWMOWER GRINDER

"You Grind It As You Find It."

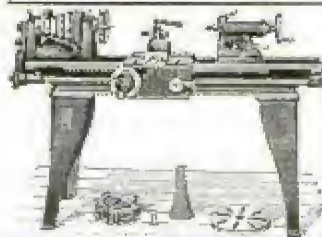


1911 Model now ready. Better than ever before. Ball-bearing Main Shaft and Grinding Wheel. Grinds all makes of Mowers perfectly in 15 minutes, without removing ratchets or wheels. Over 5,000 in use.

Write Today for full information of this wonderful labor-saver and money-maker. No up-to-date shop complete without it. Will more than pay for itself the first season because it does the work so much quicker and better. Used by U. S. Government and N. Y. City Parks, New Skate Sharpener Attachment for grinding skates. Fully warranted. **Write now—TODAY.**

HEATH FDY. & MFG. CO., PLYMOUTH, O.

GANDER IN PLACE OF DOG—Ganders may take the place of dogs as pets and protectors in Weld county if others can be found as wise and helpful as the gander owned by a Colorado farmer. It takes its



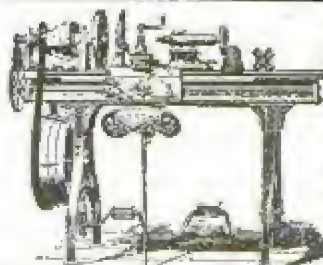
Screw Cutting Lathes

Foot or Power, 9 to 13-inch swing. Cut shows 11-inch lathe, takes 34 inches between centers, complete with foot power or countershaft.

Price, \$100.00

Write for catalog showing price of all sizes.

SOUTH BEND MACHINE TOOL CO., 423 Madison St., South Bend, Ind.



LATHES

9 to 13-inch Swing

List price \$75 and up according to size. When ready to buy send for Lathe Catalog and prices.

W. F. & John Barnes Co.
100 Ruby Street, ROCKFORD, ILL.

BUY A CRESCENT SAW TABLE

and you will get the best machine to be had at the price.

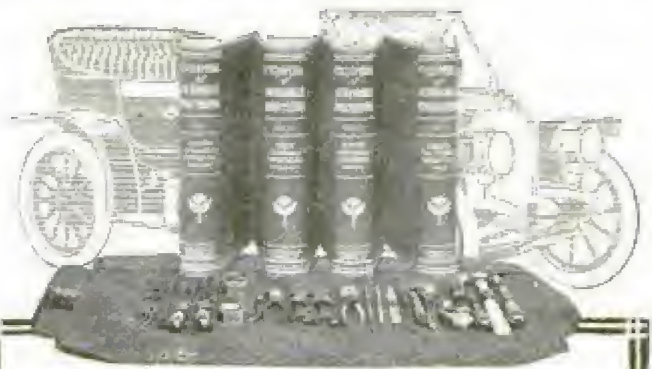
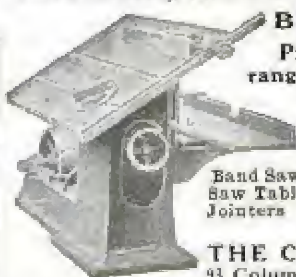
BUILT IN FIVE SIZES

Prices range from **\$67.50 to \$187.50**

Send for catalog giving complete description and telling about our fine line of

Band Saws
Saw Tables
Jointers
Borers
Shapers
Planers
Variety Wood-Workers
Planers and
Matchers
Disk Grinders

THE CRESCENT MACHINE CO.
93 Columbia St., LEETONIA, OHIO.



Know Your Auto

No matter how fine the car you own, or drive, or manufacture; no matter how thoroughly it is equipped, your outfit is not *complete* unless you own the new

Cyclopedia of Automobile Engineering

Four large, handsome volumes bound in half morocco, 1200 illustrations, full-page plates, diagrams, etc., 1500 pages, 7x10 inches, crammed with interesting and very necessary information concerning automobiles, aeroplanes, and motor boats; knowledge that you've got to get some way or other before you can thoroughly understand or enjoy the automobile "game."

CONDENSED TABLE OF CONTENTS

VOL. I—GASOLINE AUTOMOBILES: Running Gear, Power, Operation, Repair. **AUTOMOBILE MECHANISMS:** Carburetors, Starting Devices, Clutches, Gears, Brakes.

VOL. II—STEAM AUTOMOBILES: Flash Boiler, Engines, Operation and Repair. **COMMERCIAL VEHICLES:** Selection, Delivery Trucks, Upkeep, Mileage, Capacity. **TYPES:** Selection, Price, Demonstration, Speed.

VOL. III—ELECTRIC AUTOMOBILES: Battery, Motor, Transmission, Control, Tires, Capacity, Driving, Elements of Electricity, Electric Current. **AUTOMOBILE DRIVING:** Starting and Stopping, Gear Changing, Use of Spark and Throttle, Care of Car, Road Repairs.

VOL. IV—AERIAL NAVIGATION: Dirigible Balloons, Aeroplanes, Airship Motors. **GAS AND OIL ENGINES:** Ignition, Testing, **MOTOR CYCLES:** Construction, Operation. **MOTOR BOATS:** Types, Engines, Installation.

Read This Free Examination Offer

You can examine these books for five days in your own home or office, free of all cost. Don't risk missing this offer by stopping to think it over now. Order now and do your careful thinking with the books before you. That costs nothing. Mail the coupon.

Here's Our Liberal Selling Plan

If you like the books after examination, send us \$2.00; then \$2.00 a month until the special price of \$12.80 is paid. If they are not satisfactory, advise us and we will have the books returned at our expense. Order promptly, and we will include for one year, as a monthly supplement, the **TECHNICAL WORLD MAGAZINE**, a regular \$1.50 monthly, full of interesting scientific topics written in popular form.

AMERICAN SCHOOL OF CORRESPONDENCE CHICAGO, U. S. A.

FREE EXAMINATION COUPON

American School of Correspondence:

Please send *Set Cyclopedia of Automobile Engineering* for 5 days' free examination; also *Technical World* for 1 year. I will send \$2.00 within 5 days and \$2.00 a month until I have paid \$12.80; or notify you and hold the books subject to your order. Title not to pass until fully paid. Pop. Mech. 4-11

NAME

ADDRESS

OCCUPATION

EMPLOYER

LET THE RED DEVIL WATER MOTOR DO YOUR WORK

6-inch Motor

Improved construction, absolutely perfect, runs your washing machine and a hundred other things. Power for small tools. $\frac{1}{4}$ horse power on $\frac{1}{2}$ -inch pipe, 80 pounds pressure; 1 horse power on 2-inch pipe, 50 pounds pressure. New net price, \$5.00 cash with order.

No. 1492 4-inch Motors for grinding, polishing and buffing. Runs sewing machines, fans, bottle washers, etc. Price with emery, buffing wheel, silver polish and pulley, \$3.00. No. 1493 Motor and pulley only, \$2.50. $\frac{1}{2}$ horse power on 80 pounds pressure. Improved construction. Speeds, 3,000 to 5,000 revolutions per minute. Only scientifically and mechanically perfect small water motor manufactured. Patented construction makes it possible. Tremendous output warrants the price. Money back for any reason.

CATALOGUE AND LARGE SHEET FREE

DIVINE WATER MOTOR CO.

Dept. T UTICA, NEW YORK, U.S.A.

For the name of your local hardware or tool dealer, we will send you free booklet on "Theory and Design of Water Motors."



6-Inch
Bucket
Wheel

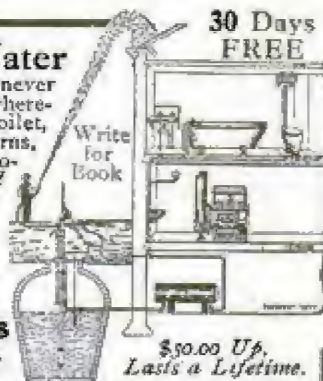
Have Running Water On Your Place

Whenever and wherever you like—Bath, Laundry, Toilet, Kitchen, Upstairs and down, Barns, Lawn. Force enough for fire protection. Air pressure guaranteed at all times by our patent pump. So simple anyone can install. Every detail worked out for your individual needs by expert engineers without charge. Complete specifications furnished.

Burton Water Works

received only medal ever awarded a water supply system—proof of its superiority. Best constructed tank on market. Sold on 30 Days' Free Trial. Correspondence with Villages, Towns, Public Institutions as well as farms, ranches, country houses solicited. Write for testimony of satisfied users near you and booklet, "An Interesting Tale Simply Told."

C. A. Burton Water Supply Co., 26 West 7th St., Kansas City, Mo.



30 Days
FREE

Write
for
Book

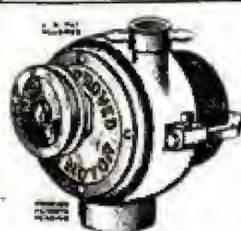
\$50.00 Up
Lasts a Lifetime.

PUMPS

The only pump, for well or cistern water, that is as good as a "JARVIS" is another "JARVIS." All sizes. Any power. We also make our own tanks. Catalog No. 4 FREE.

Complete Installations Furnished.

JARVIS ENGINE AND MACHINE WORKS LANSING, MICH.



Norton Improved Water Motor

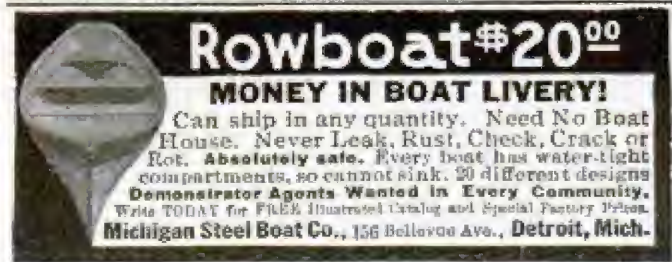
Most satisfactory power for experimenting purposes or running small lathes, dental machinery, washing and sewing machines, cream separators, coffee mills, etc. Perfect in construction; made entirely of brass; runs at a very high speed without vibration. Equipped with pulley and beveled edge grinding wheel. Sent express paid on receipt of \$6.50.

Norton Water Motor Co., Inc., Roslindale, Mass.

place on the wagon seat with its owner whenever he goes to town, and remains there until home again.

At home it keeps guard over everything and keeps chickens out of the garden. It follows the farmer over the fields when he works, and is so jealous over him that it will not allow a dog to get near.—Denver Republican.

Rife Automatic Hydraulic Ram Pumps water by water power. No attention; no expense; 2 feet fall elevates water 50 feet, etc. Guaranteed. Catalogue free. RIFE RAM COMPANY 2131 Trinity Building, NEW YORK CITY



Rowboat \$20.00

MONEY IN BOAT LIVERY!

Can ship in any quantity. Need No Boat House. Never Leak, Rust, Crack or Rot. Absolutely safe. Every boat has water-tight compartments, so cannot sink. 20 different designs. Demonstrator Agents Wanted in Every Community. Write TODAY for FREE Illustrated Catalog and Special Factory Price. Michigan Steel Boat Co., 156 Bellevue Ave., Detroit, Mich.

LEIMAN BROS. POSITIVE HIGH PRESSURE BLOWERS AND VACUUM PUMPS



Used wherever a blast of air is required; for furnaces, forges, sand blasts, blow pipes; all gas and oil appliances; boat whistles.

For VACUUM CLEANING OUTFITS

These are the only machines that take up their own wear; small piston gives big air space; no springs or delicate parts; centrifugal force holds wings against cylinder; noiseless; slow speeds.

For All Purposes

Send for Catalog No. 22 for blowers and No. 23 for vacuum pumps

LEIMAN BROS., 62 P John St., New York

Fresh Water Anywhere

You can have pure water at all times direct from the well with the **Fairbanks-Morse Domestic Water System, with Pneumatic Pump**

Other Systems deliver stored water from a tank. This System delivers water direct from several sources—forcing the water, under pressure to faucets, anywhere you want it. This is the only System with which it is possible to put your power anywhere on your place, and pump from one, two or more wells, no matter where located. Any power may be used—Electric Motor, Gasoline Engine, or Windmill.

Send For Catalog No. 449 LM

Fairbanks, Morse & Co., 481 Wabash Ave., Chicago, Ill. 1 H.P. Jack Junior Engine and Air Compressor





Here's a Beauty
THE NEW
"YANKEE"
HAND DRILL No. 1530

A Tool for Every
Mechanic or Householder

Has the same unique ratchet movement used in our popular Breast Drills, the little slide between the gears changing it instantly from a plain drill to a right and left hand ratchet; or a double ratchet where any movement of the crank forward or backward causes the drill to cut continually. A great convenience when working at close quarters where a full revolution of crank cannot be obtained. Takes round shank drills $\frac{3}{16}$ " and smaller. Drill Points carried in the handle.

Send for Tool Book (Free)
TELLS ABOUT 35 STYLES, 75 SIZES
Your dealer sells the "YANKEE."

NORTH BROS. MFG. CO.
Station Q PHILADELPHIA, PA.

SANG AT HIS OWN FUNERAL—We hear now and then of a man reading his own obituary in the papers, but it is a rare thing for a dead man to sing at his own funeral. Pietro Ficco, a shoemaker and amateur musician, had a very great fondness for the phonograph.

He purchased a good many records and occasionally sang into his own phonograph and kept records of the songs. He was taken seriously ill. He realized that he could not recover, and being a poor man and unable to get up much of a funeral, he requested that they use

ENORMOUS SAVINGS AND BETTER WORK BY USING



Eclipse Air Brush

A Scientific machine for high class work in applying—Paint, Varnish, Japan, Bronze, Lacquer.

ONE MAN CAN DO THE WORK OF FOUR

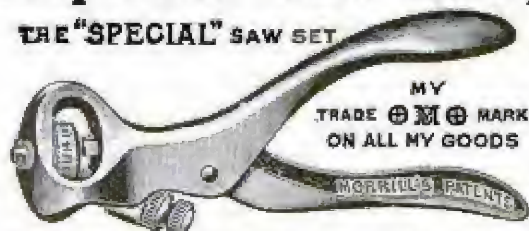
Write for Booklet and tell us what finishing you do.

ECLIPSE AIR BRUSH & COMPRESSOR COMPANY

BLOOMFIELD, N. J.

Keep Your Saw Sharp

THE "SPECIAL" SAW SET



MY
TRADE **MM** MARK
ON ALL MY GOODS

CAN BE USED BY ANYONE, AND SETS A HAND SAW SO THAT IT STAYS SHARP AND RUNS EASY, TRUE AND CLEAN.

Price \$1.00 sent prepaid, or ask your dealer for it
Chas. Morrill, 281 Broadway, New York

STAR EXPANSION BOLTS

Builders, Mechanics, Electricians,
or Anybody interested in building will be benefited by the knowledge they will gain from a demonstration of the use of the

Star Expansion Bolts

We Will Gladly Send Samples for You to Experiment With.

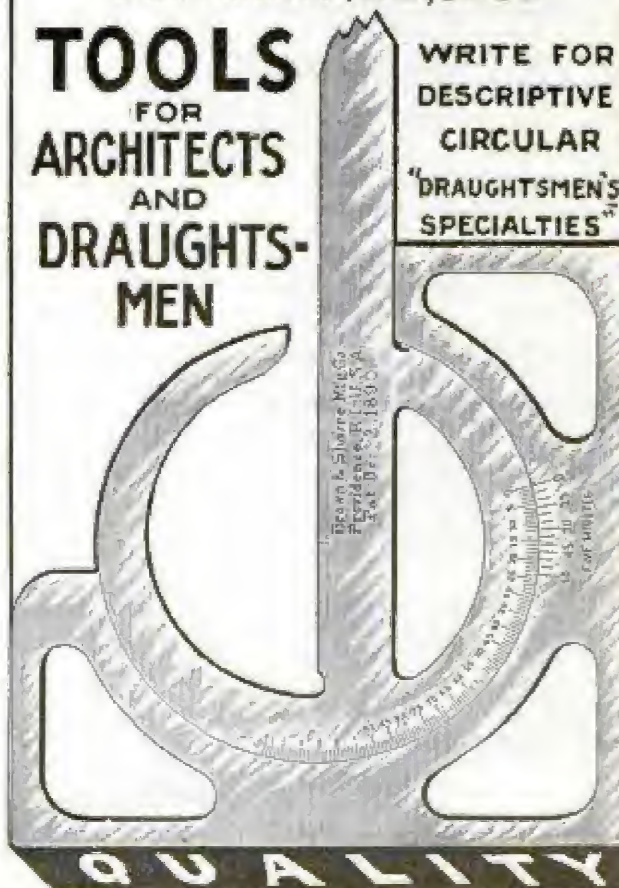
Just tell us what kind of work you are doing and we will send samples and catalogue with instructions that will prove a help to you and show you a way to save money.

STAR EXPANSION BOLT CO.
Catalogue Dept. 34, 147-149 Cedar St., NEW YORK



BROWN & SHARPE MFG. CO.
PROVIDENCE, R.I., U.S.A.

TOOLS
FOR
ARCHITECTS
AND
DRAFTSMEN

WRITE FOR
DESCRIPTIVE
CIRCULAR
"DRAFTSMEN'S
SPECIALTIES"



QUALITY



A Million People Bought Carborundum Sharpening Stones Last Year

More people than ever before bought any single brand of sharpening stones in a single year.


Proof positive that Carborundum Sharpening Stones are better than any other sharpening stones that were ever made.

There is a Carborundum Stone for Every Sharpening Need

No. 107-H—Round Combination Stone for carpenters' use	\$1.00
No. 108-H—Oblong Combination Stone for general use..	1.25
No. 103-H—Razor Hone, in neat box.....	1.00
No. 146-H—Pocket Stone, for Every Man's use; in leather case.....	.35
No. 191-H—Scythe and Grass Hook Stone .....	.25

Ask your dealer for Carborundum Sharpening Stones
If he hasn't them, send direct—Write for the booklet

THE CARBORUNDUM COMPANY, Niagara Falls, N. Y.





Measuring Tapes

Now made with **Instantaneous Readings**, the big improvement in markings. Saves time and eliminates errors. Send for sample piece of tape and our complete catalog.

THE LUFKIN RULE CO.
SAGINAW, MICH.

New York London, Eng. Windsor, Can.

ANY ONE can solder with TINOL THE NEW PASTE SOLDER

"Just put it on the spot and heat it." No rosin or acid needed. 50c a can. Self-acting alcohol torch, 50c. Complete soldering outfit, torch and can of Tinol, \$1.00. Trial can Tinol, 25c. At your dealer's, or sent by us post-paid. Money back if not satisfied.

HESS & SON
1217 Filbert St., PHILADELPHIA



his phonograph to furnish the music for the funeral services.

He picked out the "Angel's Serenade" and Gounod's "Ave Maria," sung by himself, and these were used, and thus the dead man took an important part at his own funeral service. He instructed that his phonograph and 72 records, a number of them his own, should be sent to his mother in Italy.—Christian Herald.



Make Your Own Repairs!

Mends Harness, Shoes, Canvas, Myers' Sewing Awl makes lock-stitch like sewing machine. \$1 postpaid. BIG MONEY FOR AGENTS.

C. A. MYERS CO.
6839 Lexington Ave., Chicago, Ill.

The Awl for All.



Mr. Mechanic!

Don't throw your tools one on top of the other. Keep them in good condition, orderly arranged and easily accessible in a "Gerstner" Case. Why not be up-to-date and show your fellow workmen that you are a "man who cares." Ask for our catalogue showing the best built, the neatest and most practical Tool Cases ever offered to the up-to-date mechanic. You'll find one to suit your requirements and purse—we'll please you or refund your money.

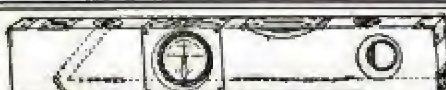
Gerstner Sons
Mfrs. of Mechanics' High Grade Tool Cases
814 Germantown Street, DAYTON, OHIO

WE SHIP ON APPROVAL



Our Hand Power Angle Benders are so indispensable for bending rods, squares, and flat pieces into all sorts of angles that we do not hesitate to ship tools for 10 days free trial. Made in 3 sizes to cover a wide range of work. We also make hand power tools for bending eyes, hooks, "U" shapes, hinges, rings, etc. Write for complete descriptive catalogue.

WALLACE SUPPLY CO., 124 No. Jefferson St., Chicago; 26 Cortlandt St., New York City



The American Combined Level and Grade Finder

Most Practical, Durable and Convenient Instrument Made

At one glance you can get the true slant on any line or grade either in degrees, inches or percentage, or all at the same time, and will at once give the exact distance needed to plumb up to a true level. The longitudinal recess shown in cut is well worth the low price of the instrument. Write AT ONCE for circular and Testimonials. Special Introductory Price given to First Applicants with privilege of taking Agency. Address **EDWARD HELB, Mfr., Box 75, RAILROAD, PENNA.**



**THIS IS THE
MITRE
BOX
YOU
WANT**

It's a LANGDON ACME

and is made in three sizes, put up with varying lengths of saws. The advantages over other styles are too numerous to mention in this advertisement, but our pocket catalogue tells the whole story. You can have one of the catalogues by asking for it. It illustrates our full line of tools.

MILLERS FALLS COMPANY, 28 Warren Street, NEW YORK, N. Y.



**The Ohio Trade Mark is a
Guarantee of High Quality**

It will pay you to insist on "OHIO" TOOLS

Send for complete catalog of
Planes, both Iron and Wood,
Chisels, Drawing Knives, Gauges, Auger Bits,
Screw Drivers, Cold Chisels,
Hand and Bench Screws,
Benches,
Cement
Workers'
Tools,
etc.



OHIO TOOL COMPANY

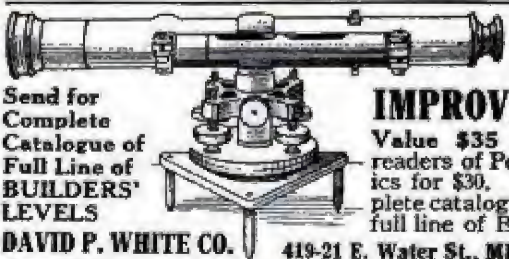
(DEPARTMENT No. 3)

COLUMBUS, OHIO

AUBURN, N. Y.

You just can't stop science in its triumphant advance. Now a Harvard scientist has succeeded in growing four toes on the hind foot of a guinea pig, instead of the three adopted in the plans and specifications provided by nature.—Indianapolis News.

A lie travels by aeroplane, while truth trudges along with lagging step, and yet it finally arrives.—Concrete Age.



\$30

Send for
Complete
Catalogue of
Full Line of
**BUILDERS'
LEVELS**

DAVID P. WHITE CO.

419-21 E. Water St., MILWAUKEE, WIS.

IMPROVED LEVEL

Value \$35 offered to the
readers of Popular Mechan-
ics for \$30. Send for com-
plete catalogue showing our
full line of Builders' Levels.

FOR MENDING HARNESS

shoes, tents, awnings, pulley belts, carpets,
saddles, suit cases, buggy tops, dash boards,
or any heavy material. Stewart's
Automatic Awl is the only
perfect Sewing Awl.

It takes a wax
thread, feeds
from spool and
does the work of any har-
ness maker machine. It is in-
dispensable for farmers. Agents wanted.
Send prepaid for \$1.25. Send at once for catalog.



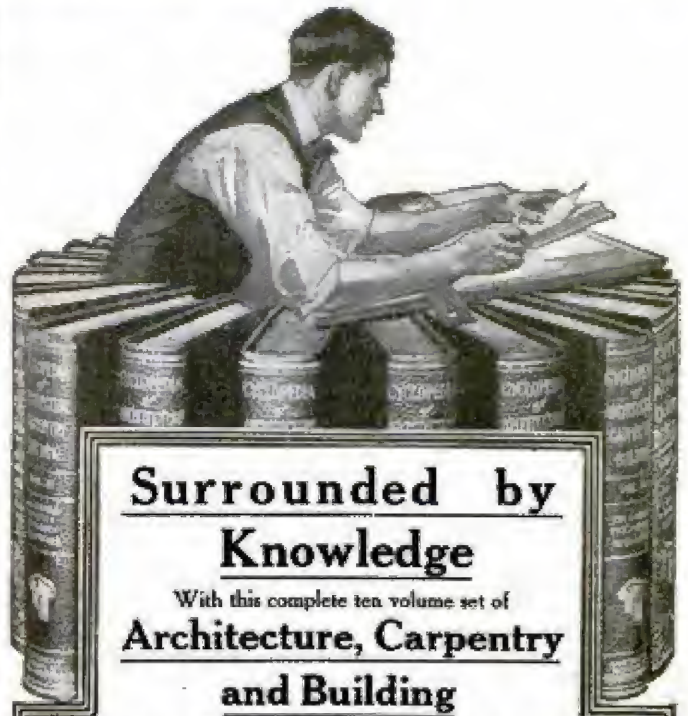
**STEWART-
SKINNER CO.**

26 Hermon Street
Worcester, Mass.



Best grade cedar canoe for \$20

We sell direct, saving you \$20 on a canoe. All
canoes cedar and copper fastened. We make all
sizes and styles, also power canoes. Write for free cat-
alog giving prices with retailer's profit cut out.
We are the largest manufacturers of canoes in the world.
DETROIT BOAT CO., 156 Bellevue Ave., Detroit, Mich.



**Surrounded by
Knowledge**

With this complete ten volume set of
**Architecture, Carpentry
and Building**

you can practically surround yourself by the knowledge you
need in your every-day work. You can have at your fingers'
ends, for instant use, the help and advice of forty experts.

The Reference Value is Guaranteed

by the fact that the books are compiled from text books used in
the correspondence courses of the American School.

Read What This Great Work Comprises

It is the most exhaustive, comprehensive and authoritative work
on the building trades ever published. Covers every branch of
building construction, from plans to finishing touches. Bound in
half morocco; 4,670 pages, 7 x 10 inches, printed on special
paper; large, clear type.

Contains: Plans, color plates and photos of buildings com-
pleted and in course of construction. Diagrams and sections
showing all details. Over 400 full-page plates. 3,000 detail
drawings, diagrams, etc. Just the thing for the student and a
practical guide for the experienced carpenter and an ever ready
reference work for the expert.

Our Liberal Offer: To introduce our Correspondence Courses,
from which the Cyclopaedia is compiled,
we offer this set of books at the special price of \$24.00, payable
\$2.00 after 5 days and \$2.00 a month. Regular price is \$50.00.
Order now and save over 50 per cent.

PARTIAL LIST OF CONTENTS

Reinforced Concrete—Contracts and Specifications—Building Materials
—Carpentry—Building Superintendence—Estimating—The Law of Con-
tracts and Liens—Masonry—Stair Building—Heating—Ventilation—
Hardware—Steel Construction—Elevators—Architectural Drawing—
Freehand Drawing—Blue Printing—Greek and Roman Orders—Water
Color Hints for Draftsmen—Painting—Wiring of Door Bells—Sheet
Metal Pattern Drafting—Mechanical Drawing—Lettering—Shades and
Shadows—Rendering in Pen, Ink and Wash, etc.

For a short time we will include, as a monthly supple-
ment for one year, the **TECHNICAL WORLD MAGA-
ZINE**. This is a regular \$1.50 monthly, full of Twentieth
Century Scientific facts, written in popular form. Also
contains the latest discussions on timely topics in inven-
tion, discovery, industry, etc.

**AMERICAN SCHOOL OF CORRESPONDENCE
CHICAGO, U. S. A.**

Please send set Cyclopaedia of Architecture, Carpentry
and Building for 5 days' free examination. Also Tech-
nical World for 1 year. I will send \$2 within five days and
\$2 a month until I have paid \$24.00, or notify you and
hold the books subject to your order. Title not to pass
until fully paid.

NAME.....

ADDRESS.....

OCCUPATION.....

EMPLOYER.....

Pop. Mech. 4-11

Please Mention Popular Mechanics

Murray Style Book

FREE

**We Want
Our Big
1911 Catalog
in Every Home**

178 pages filled from cover to cover with genuine Buggy, Harness and Saddle bargains; 251 illustrations, many in color; 138 styles of Vehicles, 74 designs in Harness; the biggest and best book ever printed in this line. Don't miss sending for it!

Murray Highest Award Buggies Direct from his Factory—Four Weeks Road Trial. Insures Safe Delivery—2 Years' Guarantee.

Before buying any kind of vehicle, just get the 1911 Murray Style Book and compare Murray Prices with all others. Costs you nothing. You might as well have this book in your home.

**The Wilber H.
Murray Mfg. Co.**
366 E. 5th St.,
Cincinnati,
Ohio

Save
\$30.00

Our
Mechanic's
Buggy



From Factory To Horse



1911 Buggy Book FREE

Send a postal—get the Book—and through it visit with Phelps the biggest factory of its kind in the world. Let him show you in his photographs how a good buggy should be made—what it should be made of. Phelps knows. They're all

Split Hickory Vehicles

—over 125 styles—every kind—auto seat Buggies, Surreys, Runabouts, etc.—all sold direct to user on 30 Days' Free Road Test—2 Years' Guarantee—at from \$25 to \$75 saving. Don't you want the Book? It will post you on styles and what you ought to pay wherever you buy. A postal gets it.

**H. C. Phelps, President,
THE OHIO CARRIAGE
MFG. COMPANY,**
Station 57, Columbus, O.
Largest Factory in the World
Selling Vehicles Direct



SCHACHT

3 Cars in 1—\$850.00

The Schacht is the greatest under \$1000 car ever put on the market for it not only is a remarkably staunch and speedy roadster, but the addition of a rear seat makes of it a big, roomy family car; or the addition of a box, an up-to-date delivery car.

SEND FOR CATALOG

THE SCHACHT MOTOR CAR CO.
2802 Spring Grove Ave., CINCINNATI, OHIO

Make a Motorcycle of Your Bike



at small cost, by using our Attachable Outfit. It fits any bicycle. Send stamp for catalog. Send 15 cents for "The Motorcycle Manual." It treats of motorcycles; how to get more power, etc.

SHAW MFG. CO., Dept. B, Galesburg, Kan.

THE HOOP-POLE MAN—The Maine hoop-pole man makes even better wages than his brother, the gum picker. The hoop-pole man follows along the wake of the loggers. He barbers the face of the hillside of stuff that no one else wants. He is after the second growth, as the young birch and ash are called which spring up around the rotting stumps of great trees.

The hoop-pole man takes a horse with him on his tours. He cuts the poles and the horse hauls them to camp at daylight. Evenings the pole man fashions the hoops with a draw shave, sitting beside a roaring fire



GEER MOTORCYCLES

We Have the Finest Line in the Country

5	H. P. Green Egg.....	\$225.00
4	H. P. Bluebird.....	200.00
2 1/2	H. P. Model 4.....	150.00

Discount to Dealers
Used Motorcycles.....\$10.00

Send for Catalog

Immediate Deliveries

HARRY R. GEER CO., 888 McLaren Ave., ST. LOUIS, MO.
Largest Motorcycle Dealers in America



10 DAYS FREE TRIAL

prepaid, to any place in the United States without a cent deposit in advance, and allow ten days free trial from the day you receive it. If it does not suit you in every way and is not all or more than we claim for it and a better bicycle than you can get anywhere else regardless of price, or if for any reason whatever you do not wish to keep it, ship it back to us at our expense for freight and you will not be out one cent.

LOW FACTORY PRICES

We sell the highest grade bicycles direct from factory to rider at lower prices than any other house. We save you \$10 to \$25 middlemen's profit on every bicycle. Highest grade models with Puncture-Proof tires, Imported Roller chains, pedals, etc., at prices no higher than cheap mail order bicycles; also reliable medium grade models at unheard of low prices.

RIDER AGENTS WANTED

In each town and district to ride and exhibit a sample 1912 "Ranger" Bicycle furnished by us. You will be astonished at the wonderfully low prices and the liberal propositions and special offer we will give on the first 1912 sample going to your town. Write at once for our special offer. **DO NOT BUY** a bicycle or a pair of tires from anyone at any price until you receive our catalogue and learn our low prices and liberal terms. **BICYCLE DEALERS**, you can sell our bicycles under our own name plate at double our prices. Orders filled the day received. **SECOND HAND BICYCLES**—a limited number taken in trade by our Chicago retail stores will be closed out at once, at \$3 to \$8 each. Descriptive bargain list mailed free.

TIRES, COASTER-BRAKE

rear wheels, inner tubes, lamps, cyclometers, parts, repairs and everything in the bicycle line at half usual prices. **DO NOT WAIT**, but write today for our Large Catalogue beautifully illustrated and containing a great fund of interesting matter and useful information. It only costs a postal to get everything.

Write
It Now.

MEAD CYCLE CO. Dept. R108, CHICAGO, ILL.

30 Days' Free Trial

and if we haven't an agent in your city, we will sell you at
Wholesale Agents' Price one

American Motorcycle or Bicycle

and prepay the freight. Hundreds of people will snap up this introducing proposition. The number of machines we sell on this liberal basis is limited—first come, first served. Here is our plan:—You ride the motorcycle or bicycle for 30 days. If it is not satisfactory, you may return it. If you like it, it's yours at the wholesale agents' price. The American Motorcycles are highest grade made, easy to start, simple to handle and powerful. You do not have to be a mechanic to run one. The American won the 1910 F. A. M. Western Endurance Contest, scoring 1000 per cent perfect. The American Bicycles are the best on the market. We give a Life Guarantee.

We have a money making proposition for live agents. Our enormous advertising campaign makes it easy to sell American machines. Don't delay a moment. Our catalog and introducing offer will interest you; it's free. Write us which you want, motorcycle or bicycle. Do it now.

AMERICAN MOTOR CYCLE CO., 104 American Bldg., Chicago, Ill.



30 Days' FREE Trial!

You Don't Pay Us a Penny If Not Pleased With
Your "America" Bicycle! New Special Offer!

GUARANTEED 10 YEARS!



The double-strength "America Truss Frame Bicycle" and "America Coaster-Brake Diamond Bicycle," the greatest values in the history of the bicycle, are now sold only from factory direct to rider AT MANUFACTURER'S PRICES—all jobbers', wholesalers', distributors' and dealers' profits being knocked off! Shipped fully equipped—NO EXTRAS to buy—on approval for free examination and free trial! Money refunded if not satisfied. Manufacturers' factory-to-rider prices allow you to own the world's biggest bicycle value at less cost than other wheels! "America" Bicycles are insured. (See catalog). A postal or letter brings special offers with catalog by return mail. It costs but a penny but saves dollars on your wheel. Write today to

(3) AMERICA CYCLE MFG. CO., Dept. 100
319 Michigan Ave. (The Old-Reliable Bicycle House) CHICAGO, ILL.

and pulling at his black pipe. Sometimes the poles are sold round, but the harvester who trims his own stuff and shaves the hoops receives two or three cents each for the finished product, and that pays.—Belfast Republican Journal.



Convert Your Bicycle into a Motor-Cycle

using our Attachable Outfit, Fits any wheel. Also Marine and Stationary Motors and Finished Castings. Stamp for catalog. STEFFEY MFG. CO., Girard Ave. and 30th St., PHILADELPHIA, PA.

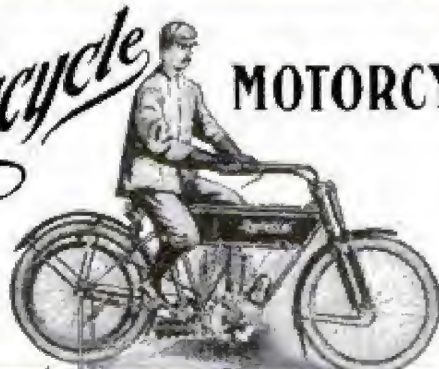
NSU

The Two Speed MOTORCYCLE

Spring Frame, Spring Forks, and a number of other improvements. Write for Proposition "P"

N. S. U. MOTOR CO.
206 W. 76th St., New York City

THE Racycle MOTORCYCLE



STARTS IN THE STAND

THIS 4 H. P. Machine, equipped with V Belt and Free Engine Clutch, controlled from the handle bar grip, requires no hard pedalling, because it starts in the stand, either on hill or level ground. With clutch detached engine runs free. Simply mount your machine and start just as easily and in real motor-car manner—

Just Like An Automobile

Rides smoothly because of anti-vibratory spring seat post. Either Battery or Magneto models can be furnished.

Controlled easily without removing hands from handle bars. Equipped with Musselman brake—surest, simplest and strongest brake made.

If you prefer, there's a model with Flat Belt and Idler—giving tightener for his belt at rider's constant command. For either business or pleasure, the Racycle Motorcycle outclasses all its predecessors as far as Racycles do ordinary bicycles.

Workmanship and materials absolutely guaranteed.

Write for our 1911 FREE Illustrated Catalog. It explains the simplicity and perfection of the Racycle clutch, and other safety and COMFORT features which make the Racycle Motorcycle the one really desirable machine.

The Miami Cycle & Mfg. Co. 32 Grand Ave. Middletown, Ohio, U. S. A.

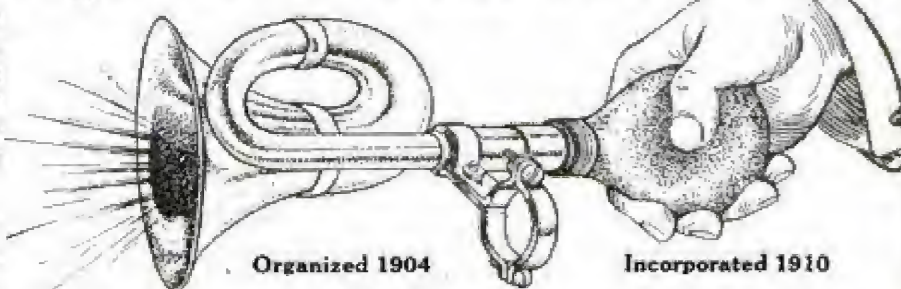
Get the opinion of any RACYLE Rider

A Meco Horn Prepaid to You For \$1.30

This is the identical horn sold all over the country for from \$2.00 to \$3.00. It is finely nickeled and made from heavy gauge brass all the way through—large bulb of best quality rubber—length 10 inches, size of bell 3 1/2 inches.

This is only one of hundreds of bargains in our big new catalog.

You can save money by buying your supplies from us. All goods sold under money back guarantee if you are not perfectly satisfied. At any rate send 4c postage for our new big 1911 catalog.



Organized 1904

Incorporated 1910

MOTORCYCLE EQUIPMENT CO.

1 Lake Street, HAMMONDSPORT, N. Y.

THE FLYING MERKEL

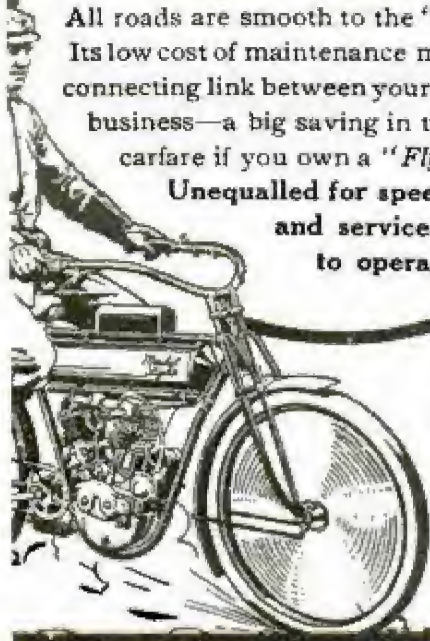
Motorcycle for Reliability, Speed and Comfort

The Merkel's Spring Frame and Spring Fork eliminate all bumping and vibration. All roads are smooth to the "Flying Merkel." Its low cost of maintenance makes it the best connecting link between your home and your business—a big saving in time, rent and carfare if you own a "Flying Merkel." Unequalled for speed, safety and service. Easy to operate.

Send for free book describing the various models of THE FLYING MERKEL—the world's best motorcycle.

**MERKEL-LIGHT
MOTOR CO.**

350-370 Hanover St.
POTTSTOWN, PA.



Lubricate—Burn cleanly
Leave no carbon deposit

ALL GARAGES—ALL DEALERS

Write for Booklet

"The Common Sense of Automobile Lubrication"

INDIAN REFINING COMPANY
INCORPORATED

First National Bank Building, Cincinnati, Ohio
123 William Street, New York City
W. P. Fuller & Co., San Francisco, Cal., Agents

PUNCTURES REPAIRED
BICYCLE TIRES

FREE

CLOVERLEAF BRAND FIXITFREE TIRES, are nearly perfect in or we could not afford this guarantee. 25 per cent of the value in a tire cannot be seen, you cannot judge a tire by its looks; all look alike except the tread design, which has no value nor merit only fancy. Wearing and puncture resisting qualities are what count. This is the service you are willing to pay for; TROUBLE SAVING, this is what we offer you. On equal ground if you receive nothing in this direction, but unless promises and "Hot Air".

Our Guaranty covers the unseen, the unknown parts; guarantees you the year's tire service WITHOUT EXTRA COST to you. All punctures and other repairs MADE FREE, or replaced with new tires, without charge, regardless of what or who is at fault. No questions, we simply do it. Local Dealers handling this brand of tires can do the same. INSURANCE TAG ATTACHED TO EACH TIRE. This special introductory price now. Order early; give also wanted; Catalog Free.

Agents Wanted. **THE VIM** Chicago, Ill. Des Moines, Iowa
Minneapolis, Minn.

CLOVERLEAF BRAND **WE PAY EXPRESS**
\$5.85 PER PAIR **FIXIT FREE**

Please Mention Popular Mechanics



MARVEL

4-5 h. p. using

CURTISS

LATEST ENGINE

WRITE TODAY FOR CATALOG

MARVEL MOTORCYCLE CO.

HAMMONDSPOUT, N. Y.

THE FIRST SLEEPING CAR—The first sleeping cars ever designed were used on the old Cumberland Valley Railroad between Harrisburg and Chambersburg, in Pennsylvania. They were built in 1838 and ran on this line for several years before other roads thought it necessary to provide accommodations for their passengers.

In these first sleeping cars one-half of the space was arranged as an ordinary day coach, with its cross seats. The other half was fitted up with 18 sleeping berths or, rather, bunks they were in these antique cars. In daytime the bunks were shifted and stowed so as to convert them into omnibus seats on the sides of the cars. Our ancestors bunked in them at night and rode in them in great state in the daytime, considering themselves true aristocrats.

There were three lengths of berths and three tiers

Save 9/10 of Your Tire Repair Expense

For five cents you, yourself, can repair any puncture easier, quicker and better than vulcanizing. "Money back if you're not satisfied" is our guaranty that all you need to permanently repair the worst puncture or blowout—in tube or casing—is your two hands and



We sold over 15,000 outfits in 1910 on this guaranty and are still in business because Tire-Doh does all we claim. With Tire-Doh you can permanently repair every injury that can happen to a tube or casing—in the garage or on the road, anywhere—and at one-tenth the cost of vulcanizing. Prove it to your satisfaction at our risk. Ask your dealer for a Tire-Doh Outfit today, price \$2. Or send us \$2 and get one express prepaid. You run no risk. Money back if you ask it.

ATLAS AUTO SUPPLY CO., 2 E. Adams Street, Chicago

Cycling a Returning Fashion

The proved perfection in design of these famous bicycles contains many distinctive features of great merit found only in

POPE

QUALITY Bicycles

CAUTION

Thousands of very low grade wheels with fancy paint and deceptive names are being sold at high grade prices.

If you see a name-plate that you do not know, beware.

Everyone knows Pope quality. Pope wheels are safe to buy and ride. \$25 to \$100.

The bicycle is the most widely used vehicle, because it serves for utility, pleasure, exercise, health, economy and business. Over 300,000 new bicycles were made and sold last year.

This trade mark is on the frame of every genuine Columbia, Rambler, Cleveland and Tribune Bicycle.

THE POPE DAILY SERVICE BICYCLE

A new proposition. Send for full particulars of this magnificent wheel and our convenient method of selling it.

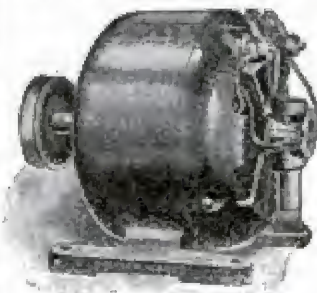
The Pope Manufacturing Co., 456 Capital Ave., Hartford, Conn.
There is a catalogue for each make. Dealers wanted everywhere



on each side of the car. The top tier hoisted on a hinge and was secured by rope supports to the ceiling of the car. The middle tier consisted of the back of the omnibus seat, hinged and supported in the same manner. The lower tier was the day seat.

In those days there was no extra charge for the sleeping accommodations.—The Sample Case.

Holtzer-Cabot Small Motors



1-6 H. P. A. C. Motor

have been developed to meet almost every requirement, and are largely used in all cases where especially difficult conditions are met.

We can solve your Motor Problems

because of our long experience in this work, because of our large variety of types, and because of our flexible and efficient organization. Write today.

THE HOLTZER-CABOT ELEC. COMPANY
BOSTON Small Motor Specialists CHICAGO

AGENTS 100% PROFIT



Most perfect and valuable Combination of tools ever invented. Sells at sight to Farmers, Plumbers, Machinists, Automobile Owners,

Made of Drop Forged high grade carbon steel. One agent in Essex County, N. Y., after a 6 days' canvass ordered 100 tools. His profit \$100.00. Big snap for agents. Sample free to workers.
T. THOMAS MFG. CO., 2848 Wayne St., Dayton, Ohio

THE Famous

Rayo Lamp

Once a Rayo user always one

The Rayo Lamp is a high-grade lamp, sold at a low price. It gives a soft, white, diffused light and does not flicker. The Rayo may be lighted without removing shade or chimney. You may pay \$5, \$10, or \$20 for other lamps but you cannot get a better light than the low-priced Rayo gives.

Dealers everywhere. If not at yours, write to the nearest agency of the

Standard Oil Company

(Incorporated)

A HANDY HOME BENCH

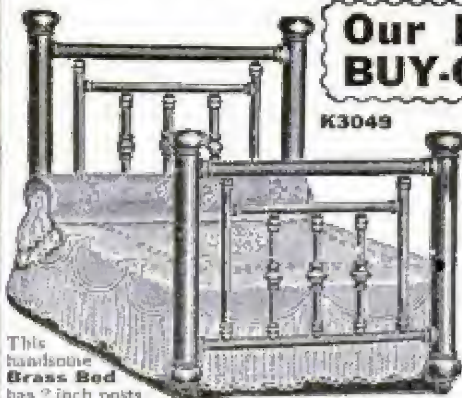
Once you buy a home bench you'll agree with us that home is hardly complete without it. There are so many uses for it that turn up unexpectedly. Spring is coming now—there will be plenty of tinkering, fixing up, etc. You'll need a bench to work with.

Style here shown has three roomy drawers and a cupboard for tools, etc. Two rises. Solidly and sturdily built and smoothly finished. Made of best maple. Will last for years. Send today for catalog of all styles and prices.



GRAND RAPIDS HAND SCREW CO.
620 N. Front St., Grand Rapids, Mich.

This Brass Bed Sent for \$2.50



This handsome Brass Bed has 2 inch posts and 1 inch top rods; the design is exactly like above illustration, either dull satin or bright finish. State which is wanted. Order No. K3049.

\$2.50 cash **\$1.25 monthly.**
Total price, \$15.50

**Our Five Great
BUY-ON-CREDIT
Catalogs**

FREE

Our Great Catalog K47—Furniture and Housefurnishings—positively saves you money, shows you exact reproductions of Carpets, Rugs, Oilcloth and Linoleums in their actual colors, also illustrates and describes Furniture, Curtains, Crockery, Silverware, Baby Carriages, Washing Machines, Sewing Machines, Office Desks, Musical Instruments, including Pianos and Organs of famous makes.

Catalog L47—Stoves and Ranges—Gives complete descriptions and illustrations of World's Best Stoves and Ranges.

Catalog M47—Is the great Watch and Jewelry guide; illustrates, describes and tells how to save the most money.

Catalog P47—Clothing for Men—Ask for this Style Book—it tells all about latest makes and styles, the lowest prices, etc.

Catalog S47—Clothing for Women and Children—a complete book, illustrating latest styles, quoting lowest prices.

One or all of these elaborately illustrated money saving books are yours simply for the asking—say which you want, it will be sent **FREE**.



This Handsome Rocker, golden oak or mahogany finish, nicely carved, upholstered with Chase leather, spring construction. Order No. K1190.

\$1.00 cash, 50 cents
monthly payments.
Total price.....\$5.50

Credit Given to Everybody On Everything by this great mail order institution—the house with thousands of satisfied customers and a successful record of over 25 years. Goods shipped any place in the United States. You use them while paying—write at once for any or all of our 5 great money-saving catalogs. Address

Straus & Schram, Inc.
Dept. 47 35th Street CHICAGO, ILL.

Test an **"IMPERIAL"** 30 Days

In Your Own Home at OUR RISK



If it does not prove the best looking, cooker and baker you ever saw, send it back at our expense.

Direct from factory to you at **WHOLESALE PRICE**
Freight Prepaid.

Has exclusive features not on any other range—such as Stone Oven Bottom, Odor Hood, Oven Thermometer, Ash Sifter, etc., etc.

Easy credit terms if wanted. Write today for Free Catalog and prices.

THE IMPERIAL STEEL RANGE CO., 869 State Street, CLEVELAND, O.

WONDER LAMP

The United Factories of 818 Wyandotte St., Kansas City, Mo., is making an offer to send a lamp free to one person in each locality to whom they can refer new customers and who will show and recommend this marvelous, new, incandescent 100 candle power oil lamp. Simply send name and address.

FREE

Aladdin MANTLE Lamp
BURNS KEROSENE (Coal Oil)

Produces powerful, white, more brilliant light than city gas, gasoline or electricity—simple, noiseless, odorless, clean, safe, durable—complete success—recognized world's standard. Fully Guaranteed.

T. H. BALL, California, SOLD 850
(On money back guarantee—not one returned, C. E. Kramer made \$700 in 60 days. Complete line of lamps and chandeliers for homes, offices and public places. Ask nearest office for agency proposition or how to get lamp free)

MANTLE LAMP CO. OF AMERICA, Dept 625
Chicago, Portland, Ore., Waterbury, Conn., Winnipeg, Montreal, Canada.

A FLOOD OF LIGHT FROM KEROSENE (COAL OIL)

HOW BABOONS ARE CAUGHT—Hagenbeck in his new book says that baboons are caught in traps made much like the huts of savages. Food is put into the huts, and once the baboons go inside a trapdoor closes behind them. Outside baboons make a great to-do, and urge the prisoners to escape. When the trappers come the captured baboons are terror-stricken and try to force their heads through the walls of the huts. One baboon was caught three times in the same trap, and several when turned loose got back into the same

BUY PLUMBING SUPPLIES Will Save You 30%
AT WHOLESALE

Don't pay retail prices. Full stock on hand for prompt shipment. Send for free catalog.
B. P. KARDON, 708 to 772 West Harrison St., Chicago

HANDY LAMP
Gasoline Lighting System

Gives a 300 Candle Power Shadowless Light the instant you move the lever. Turns up or down, like gas, burns dim when not in use, or can be turned up instantly when more light is needed. It floods a 30-ft. space with a brilliancy like daylight. Far cheaper than gas, kerosene or electricity and so simple that anyone can use it. You can depend on it for years for any purpose demanding a big, strong light. Catalog POP tells why. **Send for it Now.**

BRILLIANT GAS LAMP CO.
Dept. 1, 42 State Street, CHICAGO, ILL.

Be an Independent Buyer—
Send Name
—Book Free


Send postal for Catalogue No. 473, with special terms and compare Kalamazoo stove and range factory prices with others.

CASH OR CREDIT
Either way — you save \$5 to \$40 on any stove in catalogue 473.
"AND GAS STOVES TOO"

A Kalamazoo
Direct to You

We pay the Freight
KALAMAZOO STOVE CO.
Manufacturers
Kalamazoo, Michigan

THE "BEST" LIGHT



More brilliant than electricity or acetylene and cheaper than kerosene. Costs 2 cents per week. Casts no shadow. Most perfect light for stores, churches, factories, public halls or the home. Makes and burns its own gas. Simple, durable and handsome. In use in every civilized country in the world. No dirt. No grease. No odor. Over 20 different styles. Agents wanted everywhere. Write for catalog and prices.

THE BEST LIGHT CO.
324 E. 5th St., Canton, O.

HESS MEDICINE SANITARY LOCKER



The Only Modern, Sanitary STEEL Medicine Cabinet

or locker finished in snow-white, baked everlasting enamel, inside and out. Beautiful beveled mirror door. Nickel plate brass trimmings. Steel or glass shelves.

Costs Less Than Wood

Never warps, shrinks, nor swells. Dust and vermin proof, easily cleaned.

Should Be In Every Bath Room

Four styles—four sizes. To recess in wall or to hang outside. Send for illustrated circular.

HESS, 910 L Tacoma Bldg., Chicago
Makers of Steel Furnaces. Free Booklet.

The Recessed Steel Medicine Cabinet

trap a second time. When the baboons are carried away, all their comrades thereabout climb into trees and scream out to the prisoners, who answer in sad, mournful voices. On one occasion some big Arabian baboons were trapped, when 2,000 or 3,000 baboons hurled themselves upon the trappers, who had hard work to save themselves with firearms and clubs. As the trappers were forced back, the victorious baboons tore up the trap and turned loose the captured baboons.—Los Angeles Times.



For All Purposes High Grade Catalog Free
ENTERPRISE FOUNDRY & FENCE CO.
1214 East 24th Street INDIANAPOLIS, INDIANA



Home Ironing Machine

On Easy Payments, 30 Days' Free Trial.

A heated mangle that irons all flat pieces better, easier, and in one-quarter the time. Costs 10 to 15 hours for heat—gas or gasolene. Turned by hand, by power or by motor. "Clean Linen" booklet Free. Ask for it.
Home Ironing Machine,
6251 E. Madison St.,
Chicago

BARODA DIAMONDS.

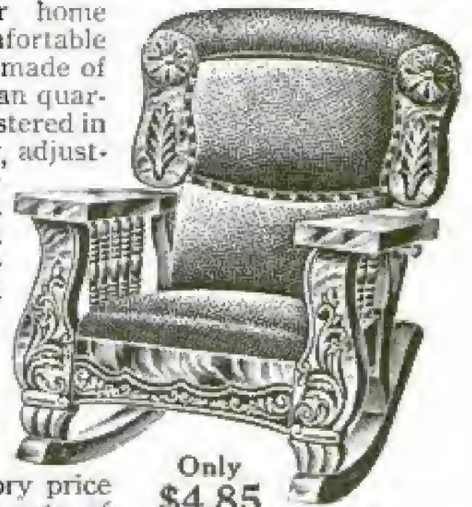
Flash Like Genuine

ANY STYLE at 1/40 the cost—IN SOLID GOLD RINGS

Stand and test and expert examination. We guarantee them. See them first—then pay. Special Offer—14k Tiffany ring 1 ct. \$5.99. Genuine ring 1 ct. \$8.99. 14k Stud 1 ct. \$4.88. Sent C. O. D. for inspection. Catalog FREE, shows full line. Patent ring gauge included, 10c. The Baroda Co., Dept. A5, Leland & Dover Sts., Chicago

Only 50 Cents

places in your home this elegant, comfortable Morris Rocker, made of genuine American quartered oak, upholstered in imperial leather, adjustable to any position. Sent on approval. If you find after examining it that you cannot match it elsewhere at double the money, pay us the balance of the special direct-from-factory price of \$4.85 at the rate of



Only
\$4.85

50 cents a month

And this is only a sample of the astonishing values we are able to offer on everything for the home—values made possible only by our enormous country-wide business, with 22 great retail stores and 800,000 customers. All the style and elegance of the best city homes are yours, at a fraction of what they would cost you anywhere else.

Liberal Credit Terms to Suit Your Convenience

Simply select what you want from our Great Catalog. The goods will go out to you at once on 30 days' free trial. If you find them better value than you can get anywhere else, pay the wonderfully low factory-to-home price in little payments that you won't miss.

So send today for your copy of our



Catalog FREE

"Everything for the Home," a big 300-page book illustrating the latest styles in home furnishings, sent absolutely free. Shows how you can furnish a home in a way that will be your pride and the admiration of your friends—shows you what wonderful values we give and why we can give them.

Write today for your free copy—no home-lover can afford to be without it.

HARTMAN FURNITURE & CARPET CO.

230 E Wabash Ave., Chicago, Ill.

Largest, oldest and best known home-furnishing concern in the world.

Established 1855—56 years of success.

22 Great Stores—800,000 Customers

\$38.95 BUYS THIS COMPLETE BATHROOM OUTFIT



**MODERN
BATHROOM
FOR EVERY
HOME**

Modern Plumbing at $\frac{1}{2}$ Ordinary Cost

Plans and instructions free with every plant.

Water Supply Outfits

from \$42 upwards.

Hot Water and Steam Plants

**SAVE \$100 to \$250 on
a Heating System**



Pumps, Pipe, Valves, Fittings at lowest prices.
Farmers' Tanks for every purpose.
Acetylene Lighting Plants Gas and Electric Fixtures
All high grade, strictly guaranteed goods.

BIG CATALOG FREE—Write to Dept. A.

**M. J. GIBBONS ARCADE
DAYTON, O.**

INVENTIONS—How to Protect, Sell and Buy Them
by F. B. Wright. Price 25c postpaid
POPULAR MECHANICS BOOK DEPT., -CHICAGO

THE Lighting Systems

Wizard

**Require No Generation
ALWAYS READY**

When You Want Light
Just Pull the Chain

It lights instantly. As convenient as electricity at one-tenth the cost.
So simple anyone can operate.

For further particulars and Agency, address
**The Nagel-Chase Mfg. Co.
143 West Ohio St., CHICAGO**

NULITE Gasoline Table Lamp

A beautiful lamp for homes, hotels, offices, stores, banks, cafes. Portable, safe; can be turned upside down or rolled on the floor without danger or affecting the light. 300 c.p. of soft, brilliant light, $\frac{1}{10}$ per hour. Also 200 different styles of lamps and systems.

AGENTS—We want town, county and travelling salesmen. Best proposition ever offered. Sells everywhere. **WRITE FOR SPECIAL OFFER.**

**CHICAGO SOLAR LIGHT CO.
222 S. Jefferson St. CHICAGO**

A PULL TURNS ON THE SUNLIGHT

Better than electricity or city gas, cheaper than kerosene or candles. Steady, white, brilliant; $\frac{1}{10}$ per hour. Burns 97% air. Lighted or extinguished by pull of chain. No smoke, no soot, no odor, no grease, no wicks to trim.

Helios Light Absolutely Safe

For homes, stores, halls, factories, shops, churches, hotels, public buildings, streets. Delivered ready for anyone to install. Write now for free booklet and make selection from our numerous artistic styles. Exclusive territory and big money for good agents. We help you sell.

THE STANDARD-GILLET LIGHT CO., 98, Michigan St., Chicago, U.S.A.
Established 1908. Paid-in Capital \$100,000.00

PALMER GASOLINE FLAT IRON

Better and Simpler than any on the market. Housewives' delight. Can iron 5 hours steady for 1 cent. in burner heads, nothing to wear out. Cash offer. Express paid U. S. A. **\$5.00**

MODERN LIGHTING COMPANY, 236 Jefferson Avenue, DETROIT, MICH.

AGENTS WANTED

BEACON LAMP BURNER FREE

Incandescent, 100 Candle Power. Burns common coal oil. Gives better light than gas, electricity or six ordinary lamps at one-sixth to one-tenth the cost. Fits your old lamp. Unsurpassed for fine sewing or reading.

COSTS ONLY ONE CENT FOR SIX HOURS

We want one person in each locality to whom we can refer new customers. Take advantage of our special offer to secure a Beacon Burner FREE. Write today. Agents Wanted. **HOME SUPPLY CO., 248 E. C. Life Bldg., Kansas City, Mo.**

WANTED AGENTS

THE LIGHT THAT NEVER FAILS

Has been imitated but never equaled. Burns its own gas and makes more money for agents than any other artificial lighting device on earth. We give exclusive territory and large discounts to good men. For further information and full particulars address Light Dept.

**NATIONAL STAMPING & ELECTRIC WORKS
210 So. Jefferson Street, Chicago**



Double the Purchasing Power of Your Money

You do know that home surroundings exert a wonderful influence on domestic happiness, but you did not know that every room in your home could be artistically furnished at a price that is ridiculously low. Did you?

THEN you owe it to yourself—your family, to investigate this proposition. Not knowing means a direct loss to you.

MAKE \$1.00 DO EXACTLY THE WORK OF \$2.00

HOW? By having the furniture shipped direct to you from the factory in the natural wood—or stained—and in assembled, easy-to-put-together sections, together with all the materials necessary to give it the proper finish.

You ask: How does this method reduce the price?

There are five reasons:

FIRST—You pay but one profit only—the manufacturer's profit.

SECOND—You do not pay—but wait—space in this publication is mighty expensive. Why tell only part of the story? Our new Catalog No. 12 goes into detail and a Postal Card will bring it to you. It shows an extensive line of furniture for every room in the house, club or office, each piece backed by a Guarantee of Satisfaction or your money refunded.

Send that Postal NOW—RIGHT NOW

Brooks Manufacturing Co., 704 Rust Ave., Saginaw, Mich.

Ann Arbor 3 Room Lighting System for \$14.50

Ann Arbor Lighting Systems are brighter than gas, steadier and clearer than electric light, and cost about one-tenth as much to operate. Each lamp gives 300 to 500 candle power for less than 1/2 cent per hour. Fuel is gasoline; perfectly safe.

We make Complete Lighting System for Homes, Churches, Stores, Etc.

Price \$10 up, according to number of lamps desired. We make inverted area especially adapted for use in stores, halls, factories, etc.

We Want Agents who will push our line. Special terms to those who write early. Catalog and prices on request.

SUPERIOR MFG. CO.
294 Second St., Ann Arbor, Mich.

KNIFE

New Two-piece Multiple
Ball Bearing

MADE ONLY BY THE

KNIFE MFG. CO.

Sales Office, Drexel Bldg., Philadelphia
(Send for price list.)

ORIGIN OF THE HANDKERCHIEF—A writer in a French review points out that the handkerchief does not come to us from China, as has been generally believed, but from Italy. It is only 360 years ago that the handkerchief of a Venetian lady was considered a great curiosity. The handkerchief crossed the Alps and was received with great favor at the court of France.

Handkerchiefs were then made of cambric or lawn and bordered with Venetian or Alençon lace. Under Henry III of France the sachet was introduced. The

400 PLANS FOR \$1.00

(and 25c for postage)

If you intend to build send for our 400 designs of houses, cottages and bungalows from \$300 to \$12,000 and save money.

J. H. DAVERMAN & SON
1041 Murray Block
GRAND RAPIDS, MICH.



WITH A Bissell You Don't have to "PICK UP THREADS!"

No tiresome stooping, nor nerve racking effort, when you sweep with BISSELL'S latest improved "Cyco" BALL BEARING Sweeper. Cleans deeply, thoroughly, silently, confines all the dust and dangerous germs that (when you use a corn broom) simply float about, settling upon furniture and draperies, as well as menacing the health of the entire family.

For sale by all the best trade.

Prices 2.75 to 5.75

Buy now of your dealer, send us the purchase slip within one week from date of purchase, and we will send you FREE a fine quality leather card case with no printing on it.

Write for Booklet, Department 153

BISSELL CARPET SWEEPER CO.
GRAND RAPIDS, MICH.

(Largest and
Only Exclusive
Carpet
Sweeper
Makers
in the
World.)



WHITE VALLEY GEMS IMPORTED from FRANCE

SEE THEM BEFORE PAYING!

These Gems are chemical white sapphires. Can't be told from diamonds except by an expert. Stand acid and fire diamond tests. So hard they can't be filed and will out glass. Brilliance guaranteed 25 years. All mounted in 14K solid gold diamond mountings. Will send you any style ring, pin or stud on approval—all charges prepaid—no money in advance.

Write for Free illustrated booklet, special prices and ring measure. **WHITE VALLEY GEM CO.,** 900 Saks Building, INDIANAPOLIS, IND.

\$70⁵⁰ Buys This

Lowest cash store prices as follows:

No. 429 Buffet with Beveled French Plate Mirror	\$42.00
No. 428 China Cabinet, similar Mirror, glass extra	42.00
No. 345 45-in. Pedestal Table, with 3 leaves, top and pedestal lock included	47.00
No. 100 Carver's Chair	5.50
Five No. 100 Diners	22.50

Dealer's price \$159.00
"Come-Packt" price 70.50

New "Big Six" Catalog Ready

Write for our big catalog with six money saving departments: over 200 pieces of Mission and Bungalow Furniture, Willow-Weave Furniture, Olney Lace Curtains, Mission Lamps, etc. MAILED FREE.

COME-PACKT FURNITURE CO.
401 Edwin Street, ANN ARBOR, MICH.

\$159 Dining Suite in Quartered White Oak



Use this Typewriter 10-Days Free

Not a toy or rebuilt machine, but simplest, most durable standard typewriter made. Does all any \$100 machine will do and just as well. Been sold for fifteen years to business and professional men who do their own typewriting. The

Wellington Visible Typewriter

Is low in price, high in quality. We save you money by dealing with you direct.

Mechanical features of the "Wellington" are correct. They mean permanent alignment, powerful manifold qualities and long life. Our records tell of machines in constant use for 7 years without repairs. Machine has 28 keys, 84 characters and weighs 17 pounds complete. Stands 5 inches high.



We will ship machine for 10 days free trial and let it prove our claims. Write for full particulars.

THE WILLIAMS MFG. CO., LTD.,
58 RIVER STREET,
PLATTSBURGH, N. Y.

Price \$60

Guaranteed 1 year

BRIGHTEN UP Your Stationery in the OFFICE, BANK, SCHOOL or HOME by using WASHBURN'S PATENT PAPER FASTENERS



75,000,000

SOLD the past YEAR should convince YOU of their SUPERIORITY.

Trade **O.K.** Mark

Easily put on or taken off with the thumb and finger. Can be used repeatedly and "they always work." Made of brass in 3 sizes. Put up in brass boxes of 100 fasteners each.

HANDSOME COMPACT STRONG No Slipping, NEVER

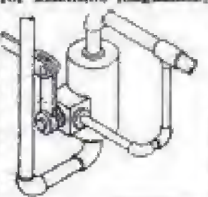
All stationers. Send 10c for sample box of 50, assorted.

Illustrated booklet free. Liberal discount to the trade.

The O. K. Mfg. Co., Syracuse, N. Y., U. S. A. N° 1 B

LEARN ISOMETRIC DRAWING Combines clearness of photograph with accuracy of working drawing. The Standard for patent drawings and illustrations for scientific magazines.

Makes quickly read working drawings. Invaluable to inventors. **THE ISOGRAPH** makes isometric projection easy; makes an expert of a novice. Wonderful proficiency obtained with practice. Apply illustrated book of instructions teaches you in a short time. Celluloid 4 x 6 inches, accurately made. Postpaid 50c. Money Order or 2c stamps. **SEND TODAY.** **THE ISOGRAPH CO.** 145 E. 23d St. NEW YORK CITY



\$1.00

VULCAN STYLO PENS

BIG PROFITS TO AGENTS

\$1.00



A smooth, perfect pen for writing, ruling and manifold. Lasts a life-time. In red or black rubber. $4\frac{1}{4} \times 5\frac{1}{2}$ inches long. (Extra size—8 inches—black only \$1.25.) Write for our complete catalog of Fountain and Stylographic Pens.

J. C. ULLRICH & CO., 27 THAMES STREET, NEW YORK CITY

Price \$12.00 at factory



This Cabinet made of Oak, finished golden, 44" long, 24" wide, has drawers, extension slide, roll front, paper cabinet, etc., as shown. We sell it at low price to introduce our OFFICE FURNITURE—Desks, Chairs, Tables, Files, Book Cases, etc. ASK FOR PRICES AND CATALOG No. 211.

We make UPHOLSTERED FURNITURE—Turkish and Odd Rockers, Parlor and Library Suites, Davenport and Couches in Oak and Mahogany, Flanders, mission and regular. Covered in best leather money will buy—every regular. Covered in best leather money will buy—every regular. Covered in best leather money will buy—every regular. Ask for prices and Catalog No. 411.

Z. H. STAFFORD MFG. CO., 242 Adams St. Chicago, Ill.

LET US GIVE YOU THIS TRANSPARENT CELLULOID TRIANGLE

It is 4 inch size, $30^\circ + 60^\circ$ angles. Lowest retail price, 25 cents. Absolutely essential to everyone who draws. We make this offer to introduce our new catalogue showing

SPAULDING'S NEW CARRYING CASES AND COMPLETE OUTFITS

for designers, architects, engineers and students—compact, durable and convenient. Spaulding's Carrying Cases are made light and strong. They provide well arranged compartments, including space for drawing board and T square. Handled like a suit case; unique, practical, inexpensive. Outfits include all necessary equipment. If you draw, send us five 2-cent stamps to-day to pay postage and get the free triangle and the catalogue.

SPAULDING PRINT PAPER CO.

44 Federal St.

BOSTON

handkerchief was taken into Germany a little later and was known as the "labelletto," after its Italian name. Only persons of quality used it, and an edict in 1595 was published at Dresden interdicting the use of the handkerchief among the trading classes.—London Globe.



TYPEWRITERS ALL MAKES

All the Standard Machines SOLD or RENTED ANYWHERE at $\frac{1}{4}$ to $\frac{1}{2}$ RETAIL PRICES, allowing RENTAL TO APPLY ON PRICE. Shipped with privilege of examination. Write for Illustrated Catalog L.

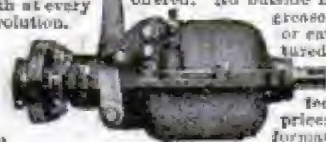
TYPEWRITER EMPORIUM, 93-94 Lake St., CHICAGO

Nothing
External
Revolves

DETROIT REVERSE GEAR

Starts—Reverses—Stops
INSTANTANEOUSLY

All working
parts sub-
merged in oil
both at every
revolution.



(60)

The Simplest, Most Reliable, Most Compact and the Smallest Perfect Marine Reverse Gear ever offered. No outside moving parts to throw the oil or grease, tear the skirts, bruise the hands or catch wags. No noise. Manufactured in sizes for from 2 to 50 H. P.

We carry all sizes in stock for immediate shipment. Guaranteed for one year. Write for special prices and free catalog. Valuable information from our Consultation Department FREE to motor boat men.

Detroit Engine Works, 24 Beaufait Ave., Detroit, Mich.

ALOE—For Fifty Years the Standard of the World for Quality. Established 1860—ALOE

Civil Engineering and Surveying Instruments

DRAWING MATERIALS AND SUPPLIES
BLUE PRINT PAPER, TRACING CLOTH, ETC.

"FREE." Write for Catalogue. Sent "FREE."

A. S. ALOE COMPANY, 514 Olive Street, ST. LOUIS, MO.



MESCO Electric Signal Horn

**Autos
and
Boats**

Approved for
Marine Use



**Efficient Strong Note
Economical Clear Tone**

Warns without offending. Made of heavy cast and wrought brass, highly polished. Price complete with Push Button, 10 ft. Cable and necessary screws for attaching . . . **\$15.00**

Arranged for Motor Boat **\$15.50**

Manhattan Electrical Supply Co.

NEW YORK . . 17 Park Place
CHICAGO . 186-188 Fifth Ave.

China is cutting off her queues, thus setting an example to those less civilized people who continue to wear bales of hay and wire mattresses for head ornaments.—Indianapolis Star.

NEW WIRELESS WONDER



Aero Field Receiving Outfit. Weight only 4 oz. Receives up to 75 miles. The wireless sensation of the year. Price \$4.00; without phones, \$2.50.

Send 3c for Catalogue

ETHERIC ELECTRIC CO. 278 Lenox Ave.
Corner 124th St.
Salesrooms and Factory 71 Barclay St., NEW YORK, N. Y.

MODERN ELECTRICS

The greatest, most instructive electrical Magazine printed. Prints more wireless and "How to make things," articles than all electrical magazines combined. Experimental Department, intensely interesting. Wireless contest each month.

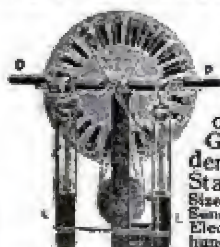
SPECIAL OFFER: 6 months for 25c. \$1.00 a year. On all News Stands.
Modern Electrics Publications, 231 Fulton St., New York

ELECTRIC

GOODS FOR EVERYBODY. World's headquarters for Dynamos, Motors, Fans, Toys, Railways, Batteries, Belts,

Bells, Pocket Lamps, Telephones. House Lighting Plants, Books. If it's electric we have it. Undersell all. Fortune for agents. Big Catalogue 4 cents.
OHIO ELECTRIC WORKS, CLEVELAND, OHIO

The "ELECTRO" STATIC MACHINE



Guaranteed to throw a 3-inch spark by merely turning the crank. This machine will give you more amusement than anything you have ever had, and you can perform thousands of experiments with same. Lights Geissler and X-Ray tubes, charges Leyden jars, fires powder, works Wireless Stations, raises a person's hair, etc.
Size 11 1/2 x 14 1/2. Weight 8 lbs. PRICE **\$3.75**
Send 4 cent stamp for our great 196-page Electrical Encyclopedia No. 9 containing hundreds of experiments.

"Everything for the
Experimenter."

THE ELECTRO IMPORTING COMPANY
233a Fulton Street NEW YORK CITY

Bargain Prices on New and Used Electrical Machinery



We Buy, Sell, Rent, Trade and Repair Electrical Machinery. Our Stocks are Large, Prices Low and our Used Machinery is as Good as New. Write for Bargain Booklet Number Twenty. Tell us what you have and what

you need. We can interest you.

SWITCHBOARDS

For POWER or LIGHTING

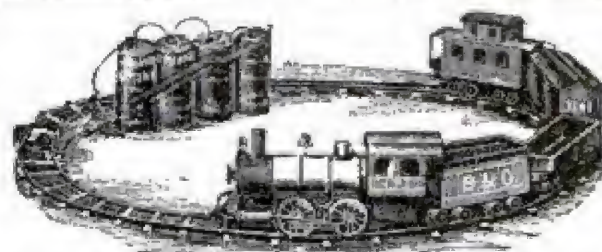
Whether large or small, Alternating or Direct Current, we do or will build the Switchboard that meets your requirements.



Ask for Switchboard
Bulletin Number Twenty-two.
It gives prices.

We do not handle novelties or toys.

The F. BISSELL COMPANY
226-230 Huron St. TOLEDO, OHIO



Electrical railways, tracks, switches, trolley cars, dynamos, motors, dynamo castings, gas engine castings, everything for the young electrician. Send for our complete catalog "B."

The Carlisle & Finch Co.
262 E. Clifton Ave. Cincinnati, Ohio

SECONDARY "UNITS" FOR WIRELESS
INDUCTION COILS AND TRANSFORMERS; THESE UNITS COST BUT LITTLE MORE THAN WIRE ALONE. SEND 2 CENT STAMP FOR WIRELESS CATALOGUE.

Dawson & Winger Electric Co., 429 Dearborn Street, Chicago

ELECTRICITY

The most wonderful and fascinating scientific study of the age. Every Boy, Girl and Grown-up should know about it. The new "VOLTAMP ELECTRICAL PRODUCTS"—our

112 Page Catalog now ready, the most complete and interesting book ever issued—is full of illustrations and descriptions of the latest Voltamp. Electrical Novelties—Motors, Dynamos, Toys, Machine Models, Telegraph and "Wireless" Instruments, Ruhmkorff Coils, Spark Coils, Geissler Tubes, Switches, Meters, Lamps, Flashlights, Transformers, Tools, etc. The greatest line of Miniature Electric Railways ever shown. Ideal Christmas Gifts. Prices consistently low.

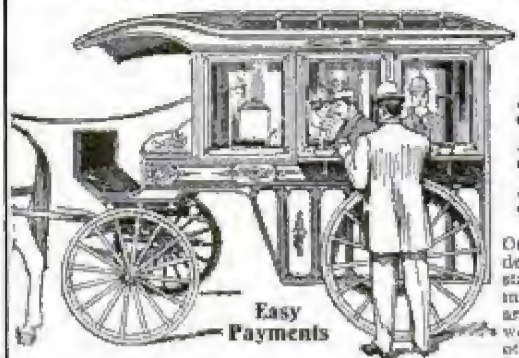
Send for this Catalog -- 6 cents in stamps or coin, which will be refunded on first order of 50 cents or over. No postals answered.



VOLTAMP ELECTRIC MFG. CO., Voltamp Bldg., Baltimore, Md.

\$50 to \$150 a Week

Now Earned by Operators of Our
Hot Lunch Cars
and Ice Cream Cone Wagons



With or Without
Peanut and Pop-
corn Equipment.

\$225
\$300
\$500

Our free catalog describes how to start a big money-making business, and tells of the wonderful success others are having. Explains our easy

payment plan—write for it today. Our Combination Lunch and Ice Cream Cone Wagons offer an exceptional opportunity for men with small capital. They are equipped with air pressure gasoline supply tank, 3-burner stove, light fixtures, coffee urn, hamburger pan, red-hot boiler, waffle and ice cream cone trays. Peanut and Popcorn equipment. A small cash payment with order and balance in monthly installments.

ALLIANCE MFG. CO.

114 Main Street,

STREATOR, ILL.

The Illustrator Magic Lantern

Beautifully nickelled
Strongly finished
Lenses the best



Our Illustrator Lanterns are used by the leading Lecturers, by the Largest Universities, Colleges, and Schools. Complete Price Lists mailed on application. This lantern accommodates Electric Arc, Incandescent, Lime, and Alco-Radiant Lights.

POST CARD MAGIC LANTERN

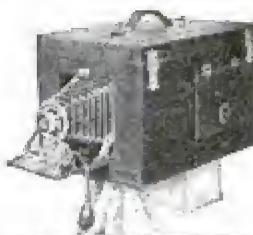
It shows on a screen the image reflected from a post-card or any other picture or flat object. Prices \$4.50, \$13.50, \$25.00, \$50.00. WILLIAMS, BROWN & EARLE, Inc. Dept. 20. 913 Chestnut St., Philadelphia, Pa.

Your Picture in a Postal Card IN ONE MINUTE



The pictures are developed, toned and finished in a single developing solution. No experience is necessary. Price of machines \$7.50 and \$15.00—circulars describing our machines sent free. We are also headquarters for supplies for all minute picture machines.

AMERICAN MINUTE PHOTO COMPANY
Dept. U. 729-728 W. 12th St., Chicago, Illinois
The largest manufacturers and distributors of minute picture machines and supplies in the world.

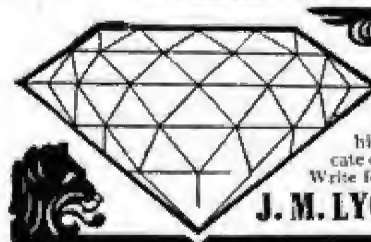


500% PROFIT

Operating a Daydark Photo Post Card Machine. Three photo postal cards of any object made and delivered on the spot in ten minutes. No experience required—no dark room necessary. All work done in the machine in open day. Establish a profitable business at home by opening a Daydark Postal Parlor. Big money maker on the street, at fairs, etc. Send at once for free catalog and sample post card showing the fine work the machine does.

Daydark Specialty Co.

2109 Cass Ave., St. Louis, Mo.



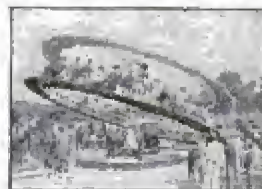
Diamonds on Credit

20% Down; 10% a Month

Every customer is protected by our written guarantee to refund his money if his dealer can duplicate our diamond at our price. Write for Illustrated Catalog No. 3.

J. M. LYON & CO., 71-73 Nassau St., New York City

FORTUNES MADE



operating the

"CIRCLING WAVE"

The latest invention and the Catchiest Amusement Riding Device in use. For catalogue, testimonials and price, write

ARMITAGE & GUINN

22 Mill St., Springfield, Erie Co., N. Y., U. S. A.

EXCEPTIONAL BUSINESS OPPORTUNITY

\$5 to \$15 per Day

has been made printing business, calling cards, postals, tickets, etc., in department stores, parks, fairs and store windows.



900% Profit

Blank cards cost 5c per hundred; sell for 50c printed.

Only \$175.00 on easy payments
PAYS FOR ITSELF

Automatic Card Printing Presses—practical, easily operated, self-feeding and inking; uses standard type; prints 120 cards per minute. Free catalog and sales plan.

AUTOMATIC PRINTING PRESS COMPANY
218 So. Jefferson St. CHICAGO

WHAT THE SOUTH YIELDS ANNUALLY

\$2,690,000,000 from its factories.
\$2,600,000,000 from its farms.
\$440,000,000 from its forests.
\$280,000,000 from its mines.
\$1,000,000,000 of cotton with seed.
\$730,000,000 of grain.
\$200,000,000 of live stock.
\$175,000,000 of dairy products.
\$170,000,000 of poultry products.
\$150,000,000 of fruit and vegetables.
\$69,000,000 of tobacco.

Greider's Fine Catalogue

of purebred poultry, for 1911, over 200 pages, 57 large colored pictures of fowls, calendar for each month, illustrations, descriptions, photos, incubators, brooders, information, and all details concerning the business, where and how to buy fine poultry, eggs for hatching, supplies, etc. at lowest cost, in fact the greatest poultry catalogue ever published. Send 15c for this handsome book. **B. H. GREIDER, Box 2, REEDS, PA.**



We ship equal from St. Paul, Buffalo, Kansas City or Boston.

are better. Satisfaction guaranteed. Write for book today or send price now and save time.

Erie City Incubator Company, Box 164 Racine, Wisconsin

\$7.55 Buys Best 140-Egg Incubator

Double cases all over; best copper tank; nursery, self-regulating. Best 140-chick hot-water brooder, \$4.85. Both ordered together, \$11.50. Freight prepaid (E. of Rockies). No machines at any price



Only \$9750 Per Carat for Perfect Cut, Genuine Diamonds



We save you 40%. Learn all about the BASCH plan. Write for catalogue "A." guarantee, money-back contract and prices FREE. Diamonds sent C. O. D. with privilege of examination.

L. BASCH & CO., 272 State St., CHICAGO, ILL.

Save Money in Building. Write for Free Booklet and Samples of

BISHOPRIC WALL BOARD AND SHEATHING



BISHOPRIC WALL BOARD is cheaper and better than Lath and Plaster: applied Winter or Summer. YOU can easily nail it to studding. Applied dry it sets once ready for paint, paper or lath. It is clean and sanitary: guaranteed proof against dampness, heat, cold, sound and vermin. Made of kiln-dried dressed lath, imbedded in hot Asphalt Mastic and surfaced with sized sand. It is cut at the factory into uniform sheets, and is: 4 ft. sq. Price: \$2.50 per 100 sq. ft., or \$6.40 per cent of 256 sq. ft. C.C.B. factories, New Orleans, Cincinnati or Alma, Mich.

The Mastic Wall Board & Roofing Mfg. Co., 60 E. Third St., Cincinnati, Ohio

BISHOPRIC SHEATHING saves 75 per cent in material and labor. Same as Wall Board, but curved surface of sheathing is not recommended for decorative purpose; therefore cost less. Quickly nailed to studs with laths and asphalt exposed. Makes smooth, solid job. Does away with building paper. Proof against heat, cold, dampness. Price \$2.34 per square of 100 sq. ft., or \$5 per cent of 256 sq. ft. C.C.B. New Orleans, Cincinnati, or Alma, Mich.

Write for Booklet and Free Samples of Wall Board, Sheathing and Roofing.

Show weatherboards over Sheathing, lath side exposed; also Bishopric Roofing over Sheathing, smooth side exposed.



BE YOUR OWN BOSS Make Money Easy

AGENTS wanted in every county to sell the popular Golden Rule Knives with name, address, photo, lodge emblem, etc., on handle. Agents earn \$75 to \$200 a month selling our shears, transparent handled pocket knives and razors. Big profits, quick sales. Exclusive territory. Experience unnecessary. WE TEACH YOU NOW. Write today for terms and become one of our successful salesmen.

GOLDEN RULE CUTLERY CO., 362 Wendell St., Dept. 99, CHICAGO

Wheel Chairs

A Wheel Chair is often an invalid's greatest comfort. We offer over 75 styles of these easy, self-propelling and invalid's Rolling Chairs, with latest improvements. Ship direct from factory to you, freight prepaid, and sell on **THIRTY DAYS' TRIAL**. Liberal Discounts to all sending for free Catalogue NOW.

CORDON MFG. CO.
472 Madison Ave., TOLEDO, OHIO

A Genuine Panama for \$1.00

An Introductory Bargain
This is just as good a Panama Hat as one costing \$10, except it is coarser weave. Warranted genuine, hand-woven, direct importation from South America. Weight 2 oz.; durable, flexible, easily shaped. Worn by everyone, man or woman. Looks like an expensive woman's Panama when trimmed. **Our Bargain Price to introduce only \$1.00.** 2 for \$1.88. We prepay all charges.

\$1.00 Mexican Palm Hat 50c

Over 75,000 sold to pleased customers. Warranted genuine hand-woven in Mexico from strong palm fiber; colored design woven in blue. Light, cool, comfortable—not hurt by rain. Retailer \$1.00: our Introductory Price only 50c. Three for \$1.25. Both hats here offered sent prepaid for \$1.30. Money back if not pleased. Write today for Free Catalog of Mexican and Panama Hats; it will give you 30 per cent on your summer hat cost.

FRANCIS E. LESTER CO., Dept. E44H MESILLA PARK, NEW MEX.

BENJAMIN AIR RIFLE FOR MEN AND OLDER BOYS

An air gun that will shoot through half inch plate easily. Many times more powerful than spring guns. Uses compressed air, same as air brakes, rock drills, etc. 100 pays for 1,000 shots (delivered 30c). Practical for small game. 37 inches long. Walnut stock. Nickel barrel. Take down. Sold by dealers everywhere. If your dealer does not carry it, write us. Sent prepaid east of Rocky Mountains on receipt of \$2.50. Pacific Coast and Papale Post Countries \$3. Circular free.

Benjamin Air Rifle & Mfg. Co., 2002 Frisco Bldg., St. Louis, Mo.

\$50,000,000 of sugar products.
\$628,000,000 of exports.
24,000,000,000 feet of lumber.
1,250,000,000 pounds of cotton goods.
1,104,000,000 bushels of cereals.
100,000,000 tons of coal.
25,000,000 barrels of petroleum.
9,000,000 tons of coke.
6,400,000 tons of iron ore.

Geisha Diamonds

THE LATEST SCIENTIFIC DISCOVERY
Bright, sparkling, beautiful. For brilliancy they equal the genuine, standing all test and puzzle experts. One twentieth the expense. Sent free with privilege of examination. For particulars, prices, etc., address

THE R. GREGG MFG. & IMPT. CO.
Dept. 14, 517 Jackson Blvd., Chicago, Ill.

For real tobacco flavor, not pipe odor, smoke the

ABSORBO PIPE

Absorbs the nicotine like a sponge—ensuring a cool sweet smoke without injurious after effects. Colors a beautiful rich brown.

Money back if not satisfactory
Send for our 200 A list

SMOKE SHOP SPECIALTIES CO., 296 Main St., Holyoke, Mass.

Length of Pipe 5 1/2"
Sent prepaid 50c
\$ for \$1.25

Our Smart Cards in CASE

THE JOHN B. WIGGINS COMPANY
SOLE MANUFACTURERS
ENGRAVERS, DIE EMBOSERS, PLATE PRINTERS

To the End of Time

You will be judged by your acts. If you prefer not to be misjudged, send in a

Peerless Patent Book Form Card

Its smooth edges; its genuine elegance will tell the character of man you are. Nothing else like it. Used by the men who care for appearances and who command big pay. It ought to be used by you. Send today for sample tab of engraved cards, and get right in the card line.

17-19 E. Adams St., Chicago
New York Office, 350 Broadway

Send For Our Free Vibrator Book



If you send your name and address we will send you **Free** our Vibrator Book describing the White Cross Electric Vibrator shown here.

Merely send a Postal Card and our FREE Vibrator Book will be mailed to you.

This Vibrator is a rubbing machine which draws the blood to any aching part of the body to do its work. This machine rubs much better and much faster than the hands.

While the hands are able to give a few dozen rubs per minute the machine gives several thousand rubs. It rubs hard or gently, just as the operator chooses. The machine can be operated by anyone in his own home.

*Send today for the
FREE VIBRATOR BOOK*

Lindstrom-Smith Co.
253 La Salle St., Dept. 1194
CHICAGO

Rémoh Gems

Not Imitations

A marvelously reconstructed gem—the greatest triumph of the electric furnace. Looks like a diamond—wears like a diamond—will cut glass—stands filing, fire and acid tests like a diamond—guaranteed to contain no glass. Rémoh Gems have no paste, foil or artificial backing—their brilliancy is guaranteed forever. One-thirtieth the cost of a diamond. These remarkable gems are set only in 14 Karat Solid Gold Mountings. Sent on approval—your money cheerfully refunded if not perfectly satisfactory. It will be well worth your while to get our De-Luxe Jewel Book—yours for the asking. Cut out and mail the coupon below—or write a postal. Address

Rémoh Jewelry Co.
429 N. Broadway, St. Louis, Mo.

Rémoh Jewelry Co.,
429 N. Broadway, St. Louis, Mo.
Send your De-Luxe Jewel Book.

Name.....

Address.....

City.....

State.....

**Sign
And
Mail This
Coupon Today**

3,200,000 tons of pig iron.
2,395,000 tons of phosphate rock.
350,000 tons of sulphur.—The Manufacturers Record.



CLASS PINS AND BADGES

FOR COLLEGE, SCHOOL, SOCIETY OR LODGE

Either style with any three letters and figures, one or two colors of enamel. Sterling Silver, 25c each. \$2.50 doz.; Silver Plate, 10c each, \$1.00 doz. Catalog free. Special designs also made for any School or Society, at attractive prices. Send idea for estimate. **BASTIAN BROS. CO., Dept. 487, ROCHESTER, N. Y.**



Musselman Coaster Brake



"The Armless Wonder"—smallest, lightest, simplest and strongest bicycle brake

made. The original Armless Automatic Brake, imitated by many—equalled by none. Weighs 25 ounces. Sold by all high-class dealers, or write us, giving dealer's name, and we will advise you and send you booklet, "The Major's Story," FREE. Also made for Motorcycles.

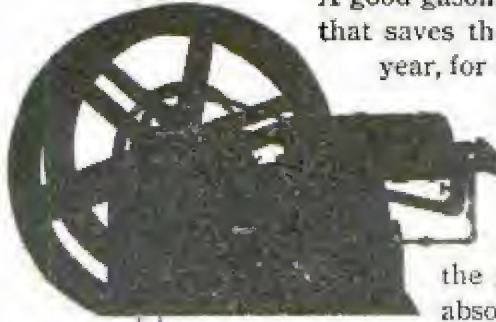
The Miami Cycle & Mfg. Co. Licensed Coaster Brake Mfrs.
32 Grand Ave. Middletown, O.

TURN YOUR TALENT INTO MONEY

Let me send you our Art Prospectus FREE. It tells how we can teach you to be an **Illustrator, Cartoonist, Designer, Water Colorist or Oil Painter**, through our Correspondence Course in your own home. Develop your Talent. It may mean Big Money to you. Artists are in great demand—many earn from \$25.00 to \$100.00 or more, a week. If you want to learn Art for pleasure or profit, write us. Terms reasonable. We teach all branches of art—buy and sell students' work—and assist in securing good salaried positions. My special 30-Day Offer will interest you, so write today.

J. JAN DVORAK, Prest., Fine Arts Institute, Studio 1194, OMAHA, NEB.

Every Stroke Saves You Money



A good gasoline engine saves time, work, and money. And the engine that saves the most work, the most time, and the most money, every year, for the longest time, is the best paying engine investment for you to make. But in order to save much of your work, time, and money, a gasoline engine must be efficient, simple, economical, strong, and durable. Otherwise, it may cause more annoyance and repair expense than the amount it saves. So you must necessarily be careful of the gasoline engine you decide on. And if you want to be absolutely sure of getting an engine that is a proven money maker, choose one of the

I H C GASOLINE ENGINES

No matter what style or size you want, it is in the I H C line. I H C Horizontal engines are made in 1, 2½, 4, 6, 8, 10, 12, 15, 20, and 25-horse power. I H C Vertical engines are made in 2, 3, 25, and 35-horse power. I H C Air Cooled engines come in 1, 2, and 3-horse power. And I H C Tractors come in 12, 15, 20, 25, and 45-horse power. And you also have choice of stationary or portable style. So whatever kind of an engine you want, you need not sacrifice the many I H C advantages.

The record of I H C engines in the hands of thousands of owners is proof of I H C superiority. But you should get all the facts from the I H C catalogue at once. Simply write a postal request and the catalogue will be sent by return mail. There is no better time than now.

International Harvester Company of America

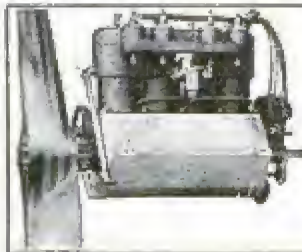
16 Harvester Building

(INCORPORATED)

CHICAGO U S A



HISTORY OF THE SAFETY PIN—A historian of invention tells us that to the wails of a long-suffering infant we owe the boon of the safety pin. Here is the story: A little boy named Harrison, an English blacksmith's son, had to look after his baby brother. The



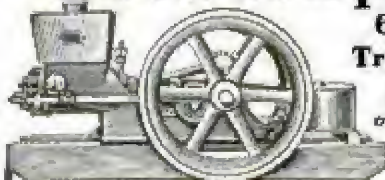
The AEROMOTOR

The most compact, powerful and light aeronautic power plant built; 4 and 6 cylinders—4-cycle—30 to 75 H. P.

Detroit Aeronautic Construction Co.
76 Crane Ave., DETROIT, MICH., U. S. A.

"Caldwell Special"

60 Days
Trial FREE



Prove it on your own premises that it saves time, saves labor and makes money.

The "Caldwell Special" is as clean cut as a race horse. Built right—works right. Simply built—always gives full H. P. Costs little to run—big profit producer to pump water, run cream separator, shred or grind corn and a dozen other things.

Write any or all the 8 Banks of Waterloo as to our responsibility. Sixty day Trial Free. We prove it to you on your own premises at our expense that you cannot afford to do without a "Caldwell Special."

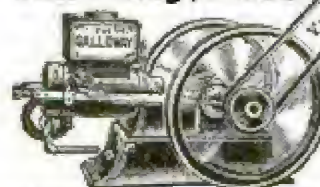
CALDWELL-HOLLOWELL MFG. CO.
514 Commerce St., WATERLOO, IOWA.

\$50 TO \$300 SAVED

We are manufacturers, not merchants. Save dealers, jobbers and catalog house profit. I'll save you from \$50 to \$300 on my High Grade Standard Gasoline Engines from 2 to 22-H.-P.—Price direct to you lower than dealers or jobbers have to pay for similar engines in carload lots for spot cash.

GALLOWAY

Price and quality speak for themselves and you are to be the sole judge. Sell your poorest horse and buy a 5-H.-P. only \$119.50



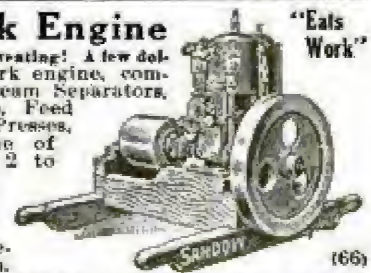
Direct From My Factory on 30 Days' Free Trial. Satisfaction or money back. Write for special proposition. All you pay me is for raw material, labor and one small profit. Send for my big BOOK FREE.

Wm. Galloway, Pres.
Wm. Galloway Co.
1965 Galloway Station,
Waterloo, Iowa.

Let SANDOW Run It!

Wonderful Work Engine

Farmers and Shop Owners. Stop Sweating! A few dollars gets this grand little work engine, complete and ready to run Cream Separators, Corn Shredders, Grist Mills, Feed Mills, Dynamos, Printing Presses, etc., etc. Gives a lifetime of steady service! All sizes: 2 to 20 h. p. No cranking! No gears! Only 3 moving parts. Finest construction. Thousands in use. Guaranteed 5 years. Write for Special Introductory Proposition.



DETROIT MOTOR CAR SUPPLY CO., 2 Canton Ave., Detroit, Mich.

DON'T BUY A GASOLINE ENGINE

until you investigate "The Master Workman," a two-cylinder gasoline, kerosene or alcohol engine, superior to any one-cylinder engine; revoly- tionizing power. Its weight and bulk are half that of single cylinder engines, with greater durability. Costs Less to Buy—Less to Run. Quickly, easily started. Vibration practically overcome. Cheaply mounted on any wagon. It is a combination portable, stationary or traction engine. SEND FOR CATALOGUE THIS IS OUR FIFTY-NINTH YEAR.

THE TEMPLE PUMP CO., Mfrs., 431 West 15th St., CHICAGO

FOR
FARM
SHOP
HOME

ELLIS
ENGINE
USE

WE PAY
THE
FREIGHT

KEROSENE

gasoline, distillate, any fuel oil, perfectly—without change.

Cheapest, Safest, Simplest POWER

for barn work, house work, mill work, dairy work, well work, grinding grain, spraying, sawing, irrigation, electric lights, pumping, cutting fodder

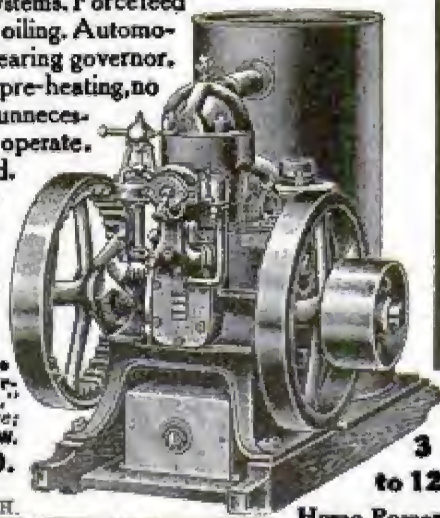
Astonishing success. More power, gallon for gallon. Hundred less parts. Patent throttle gives three engines for price of one. **Catalog free—tells how.** Double-duty tank revolutionizes cooling systems. Force feed lubricator—perfect oiling. Automobile muffler. Ball bearing governor. Starts instantly. No pre-heating, no crank. Experience unnecessary. Women can operate. Vibration eliminated. Quality high—price low. Comes complete. Always hungry for work—and thrives on it.

FREE TRIAL

No obligation till you are satisfied. **10-year Guarantee.** "Engine Facts," our new catalog, free. Write postal for it now.

ELLIS ENGINE CO.

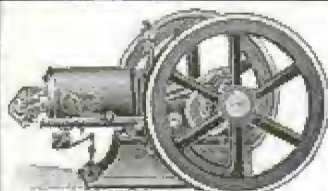
39 Mullett Street,
(vz) DETROIT, MICH.



3

to 12

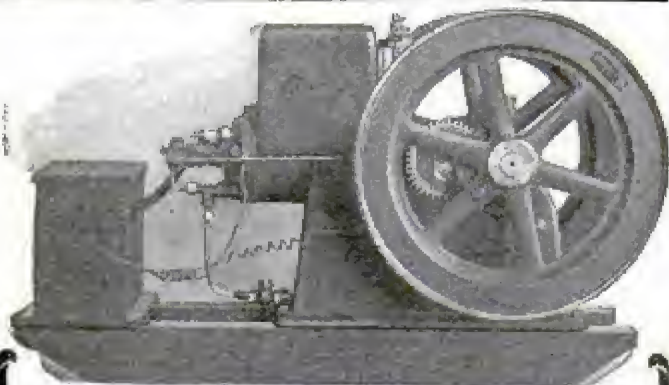
Horse Power



WHICH WOULD YOU RATHER DO

Buy a cheap engine and save \$10 to \$50 in first cost, or buy an **ECONOMIZER** and save \$50 to \$500 in running expenses? **Free Trial.**

H. L. CHAPMAN, Box 595, MARCELLUS, MICHIGAN



Get Our Price First

Don't buy until you get our Direct from factory prices and catalog describing our line of high grade

CHICAGO GASOLINE ENGINES

You want the best at the lowest cost—investigate the construction simplicity, reliability of the "Chicago"—none better. Save $\frac{1}{2}$ usual cost. Sold on **Free Trial.** Five year guarantee. Sizes 1 to 15 h. p. Write to-day.

COLBORNE MFG. CO., CHICAGO, ILL.

Use KEROSENE Engine FREE!

Amazing "DETROIT" Kerosene Engine shipped on 15 days' **FREE Trial**, proves kerosene cheapest, safest, most powerful fuel. If satisfied, pay lowest price ever given on reliable farm engine; if not, pay nothing.

Gasoline Going Up!

Automobile owners are burning up so much gasoline that the world's supply is running short. Gasoline is 9c to 15c higher than coal oil. Still going up. Two pints of coal oil do work of three pints gasoline. No waste, no evaporation, no explosion from coal oil.



Amazing "DETROIT"

The "DETROIT" is the **only** engine that handles **coal oil** successfully! uses alcohol, gasoline and benzine, too. Starts without cranking. Basic patent—only three moving parts—no cams—no sprockets—no gears—no valves—the utmost in simplicity, power and strength. Mounted on skids. All sizes, 2 to 20 h.p., in stock ready to ship. Complete engine tested just before crating. Comes all ready to run. Pumps, saws, threshes, churns, separates milk, grinds feed, shells corn, runs home electric-lighting plant. **Prices (shipped), \$29.50 up.**

Sent any place on 15 days' **Free Trial**. Don't buy an engine till you investigate amazing, money-saving, power-saving "DETROIT." Thousands in use. Costs only postal to find out. If you are first in your neighborhood to write, we will allow you **Special Extra-Low Introductory price.** Write!

DETROIT ENGINE WORKS, 213 Bellevue Ave., DETROIT, MICH.

This Engine FREE for 30 DAYS

Test it out and prove to yourself it's the best little all-around gasoline engine ever produced. Adapted for all uses in Shop, Farm and Home. We ship complete ready for use. Simply fill in the gasoline—give it a turn and away it goes.



THOMPSON GASOLINE ENGINES are built on correct lines. Let us send you free book and tell you all about our wonderful 30-Day Free Trial Offer. Write today.

J. THOMPSON & SONS MANUFACTURING CO., 22 Oak St., Beloit, Wis.

baby often cried, and its tears were usually traced to pin punctures. The boy nurse tried a long time to bend the pins in such a form that they could be used with safety to his brother's flesh. In this he failed, but his father, the blacksmith, perceiving the utility of the idea, that the lad had been at work on, took it up on his own account and eventually turned out the safety pin that is in use today all over the world.—Kansas City Star.

5 YEAR GUARANTEE Price WATERLOO BOY THE PRICE MAKER

No other gasoline engine reduced the price of gasoline engines like the **WATERLOO BOY**

Has fewer parts than any other engine. It costs less to make few parts than many parts. **WATERLOO BOY** is made in large quantities. It costs less per engine to make

100 engines a day than 10. That's why we make the under-selling price.



Service
Waterloo Boy
is Dependable

Always ready to go. No fuss. No backing. Starts easy in winter. Igniter simple as a pair of scissors. Automatic feed regulation does away with both the expense and bother of a pump. Speed lever works like a throttle on a locomotive. Nearly all parts are interchangeable. If you want satisfaction all the year round, buy the Waterloo Boy. Waterloo Boy Lasts. Built of best material by men that know how.

Durability
Waterloo Gasoline Engine Co.,
1021 W. 3rd Ave.,
Waterloo, Iowa.

WE DO AS WE ADVERTISE

Shop, Mill and Factory Supplies

SAVE MONEY BY BUYING YOUR

**Pulleys, Shafting, Hangers, Belting,
Gears, Sprocket Wheels, Chain Belt**

in fact anything in the line of appliances for transmitting Power, from us.

We are the largest Manufacturers of Pulleys in the United States.
No order too small for attention. No order too large to execute.

OUR CATALOGUE A-18 SHOWS OUR COMPLETE LINE

W. A. Jones Foundry & Machine Co. MAIL ORDER DEPARTMENT
1400 North Avenue, CHICAGO, A.S.A.



WITTE ENGINES
GAS - GASOLINE - DISTILLATE
Cheapest of all powers. One cent average cost per horse power per hour. Nothing can equal.
FIVE YEAR GUARANTEED
We build all sizes. Hopper jacket or water tank cooling. Inducements to introduce in new localities. Write stating size and style wanted.
WITTE IRON WORKS CO.
1654 Oakland Ave., Kansas City, Mo.

\$40 2 H.P. COMPLETE
With fittings, including propeller and shafting, stuffing box, wiring, etc.

Ready to install in your boat

This is a powerful engine for High Speed Boats, complete with all fittings. Absolutely Reliable. Extra Power and Extra Wear. Compact, Silent, Low running cost. Perfect two-cycle, reversing engine. 3 Year Guarantee. So simple a woman or child can run it. Used in Government Harbor Service and Chicago Police Boats.



3, 4, 5, 6, and 10 H.P.
Prices Are In Proportion
Special Prices to Boat Builders and Agents.

Our Engine Book No. 12 E. contains valuable facts about Marine Engines and describes complete line.

FREE ON REQUEST

NORTHWESTERN STEEL & IRON WORKS, 707 Spring St., Eau Claire, Wis.

POOR MEN'S HOTELS IN JAPAN—In the Japanese capital there are 538 poor men's hotels. The northeast of the capital is where the greatest number is to be found. In these inns the traveler is lodged in a room with a superficial area of 3 by 6 ft. If the traveler is better off and requires more cubic feet of inn, he can obtain an apartment the same length, but double the breadth; and if he be more fastidious, he can have the luxury of an apartment 6 by 9 ft. The lowest cost of a night's lodging is 8 sen.

In some parts of Japan, the lodgings at poor men's

**FAMOUS MICHIGAN SPEED WHEELS
REVERSE GEARS & MARINE HARDWARE**
MOTOR BOAT MEN
Send for our large catalog of valuable information on speed wheels, reverse gears and marine hardware. Everything new and up-to-date.
Prices Right. Satisfaction Guaranteed.
We carry an immense stock and can make you prompt shipments and save you money. Send for our free catalog today.
MICHIGAN WHEEL COMPANY
645 Canal Street, GRAND RAPIDS, MICHIGAN

Make a Motor Boat of Any Boat in Five Minutes



You can do it with the Waterman Outboard Motor, which you can quickly attach (and detach) to the stern of any skiff, row boat, dinghy, punt, sail boat, and have a good motor boat. It is not a toy, but a reliable 2 H. P. Marine Motor that will drive an 18-foot row boat 7 miles an hour, 4 hours on gallon gasoline. Simplest motor made. Weight 40 lbs. Equipped with Schebler Carburetor. Five years' successful results behind it. Send for Catalog C. Canoe Motors, 1, 2, 3, 4 Cylinders—Catalog K. Standard Type Motors, 1 to 30 H. P.—Catalog A.

WATERMAN MARINE MOTOR CO.
1507 Fort Street, West, DETROIT, MICH., U. S. A.

This Kerosene Engine Cuts Your Expenses 75%

YOU should not even consider engines that operate on gasoline only. The rapidly rising price of gasoline, now 5 to 16 cents higher than kerosene, absolutely makes operation on this fuel too expensive. The Perfection Kerosene Engine operates on **any** engine fuel. When you purchase it you are on the safe side—proof against all fluctuations of the market. You can always run this engine at a great fuel saving and get the greatest amount of work done. The Perfection vaporizes its own kerosene and so makes it as efficient as gasoline—something other engines cannot do.

The Perfection is very light, portable, has only three moving parts, runs everything about the place, is lower in price than any other engine of its capacity on the market.

PERFECTION Kerosene Engine

Sent You on 15 Days Free Trial

See your dealer at once and ask him to let you have a copy of our **Free ENGINE BOOK** which shows the sizes and styles of the "Perfection" and explains this very attractive offer. Your dealer will send any "Perfection" engine to your farm for 15 days and let you return it if you are not satisfied. Ask him about it. If he does not carry the "Perfection" write to us and we will send you our **Free Engine Book** direct.



CAILLE PERFECTION MOTOR CO.
205 Second Ave. DETROIT, MICH.

Triple the Purchasing Power of Your Money

Do you know that it is the health-giving pull of nature that makes every gingery water breeze, every glance at a beautiful lake or river, attract the red-blooded human being and make him want a boat? It's your duty to yourself—to your family—to respond to that influence.

Make \$1.00 Do Exactly the Work of \$3.00

HOW?—By purchasing the full-sized paper patterns and instructions for a boat, or by purchasing all or part of the material in the knock-down—that is, every piece cut to shape, machined and accurately fitted so that it will go together but one way only—the right way. You ask: Why does this method reduce the price? There are five reasons:

FIRST: You are spending a few pleasant hours instead of money in assembling the boat, which reduces the cost to you over half.

SECOND: You do not pay—but wait—space in this publication is mighty expensive. Why tell only part of the story? Our new catalog No. 25 goes into detail and a Postal Card will bring it to you. It shows an extensive line of boats, from canoes to cabin cruisers—every one backed by a Guarantee of Satisfaction or your money refunded.

SEND THAT POSTAL NOW—RIGHT NOW

BROOKS MANUFACTURING CO., 704 Rust Avenue, SAGINAW, MICH.

Boat and Engine Book MAILED FREE

Just like a 30-Footer
only
smaller

Do not think of Buying a Launch or Engine until you see our Handsome Book

WHICH EXPLAINS FOUR
WONDERFUL
LAUNCH
BARGAINS

Only \$121 for this

complete 16-ft. Launch—3 H. P., guaranteed self-starting Engine, weedless Wheel and Rudder. Result of 30 years' experience. Money back if not as represented. Write for free catalog today. Special Bargains in Weeco reversible, self-starting engines to those building or buying their own hulls. Engine controlled by one lever.

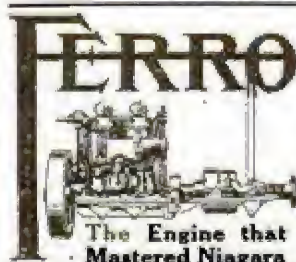
C. T. WRIGHT ENGINE CO.
609 Canal Street GREENVILLE, MICH.

BAY STATE MOTORS

"Perfect Simplicity" and "Simple Perfection" are the results, embodied in these Motors, of 15 years devoted to the developing of these essential characteristics, which enable us to put on the market a reliable and economical motor at a reasonable price. Write for catalog, stating size and type (2 or 4 cycle) of motor wanted. We also furnish castings for these motors.

BAY STATE MOTOR WORKS

Successor to
A. J. HOULE MOTOR WORKS
580 South East Street, HOLYOKE, MASS.



Write for free Ferro Book and helpful advice about boats and engines.

THE engine is the deciding factor in buying a motor-boat. We not only furnish the world's standard two-cycle boat-motor, but can help you obtain the best boats built for all purposes.

The Ferro Machine & Foundry Co.
18 Hubbard Ave., Cleveland.
Agents in Principal Cities and Ports

Baldrige Reverse Gear Controls Your Motor Boat Like an Automobile

By moving a single lever this gear makes your boat stop, go forward or backward, as you please. Engine doesn't stop. Nearly 6000 in use. Write for interesting booklet.

SMITH & BALDRIDGE MACHINE CO.
62 AMSTERDAM AVE., DETROIT, MICHIGAN

inns can be obtained for 5 sen (about a penny). There is a reduction on the 8-sen inn if the room or cubicle be engaged for two nights. This class of room is furnished with a wool coverlet; for 10 sen a second coverlet is to be had, including the room with an area of 36 ft.; and if the best class of sleeping apartment be engaged, the cost is 25 sen, or about 5d. It seems that three travelers, if they wish to keep to themselves, can hire this latter class of apartment. The patrons of these inns for the most part belong to the laboring classes.—Economete Francais.

ELECTRIC WHISTLES

and horns for motor boat, automobile, factory and fire alarm use. Searchlights, dynamo and other accessories at low prices.

SEND FOR CATALOGUE

THE EDGAR MFG. CO.
104-5 Hanover St., Boston, Mass., U. S. A. \$8.75

WATKINS' SPECIAL MOTORS

3 H. P. Single Cylinder . . . 30 lbs.
6 H. P. Double Cylinder . . . 50 lbs.
12 H. P. Four Cylinder . . . 90 lbs.

WITHOUT A PEER.

Especially adapted for CANOES or LIGHT BOATS.

INTERESTING CATALOG ON REQUEST.

THE WATKINS MOTOR CO.
837-839 West Sixth Street CINCINNATI, OHIO

5 Years' Absolute Guaranty On this Wonderful Detroit Marine Engine

You Are the Only Judge of the engine and its merits. 25,000 satisfied users. Material and workmanship guaranteed for five years.

Greatest Engine Bargain Ever Offered!

Fewest moving parts of any practical engine on the market. Nothing complicated or liable to get out of order. Only three moving parts. Extra long plastic white bronze bearings. Vanadium steel crankshaft. Adjustable steel connecting rod. All bearing surfaces ground. French gray iron castings. Water-proof ignition system. Runs at any speed from trolling to racing.

Starts without cranking. Reversible while in motion.

Perfectly counter-balanced. No vibration.

Runs at any speed from trolling to racing.

30 Days' Trial Try the engine for 30 days. If you are not fully satisfied, return it and we will promptly refund all money paid us.

Demonstrator Agents wanted in every boating community. Special wholesale price on first outfit sold. Single cylinder, 2.8 h. p. Double cylinder, 8.20 h. p. 4-cylinder, 20.50 h. p. Thoroughly tested before shipment. Comes to you complete with boat fittings and ready to run. Write for free catalog, testimonials and details of the greatest protective guaranty ever offered. Suitable for any boat from canoe to cruiser. Also railroad track car. All sizes in stock ready to ship. Write today for our wonderful demonstrator offer.

DETROIT ENGINE WORKS
1271 Jefferson Avenue, DETROIT, MICH.

A Big Bargain In A Racine-Muskegon 25 Foot Speedabout

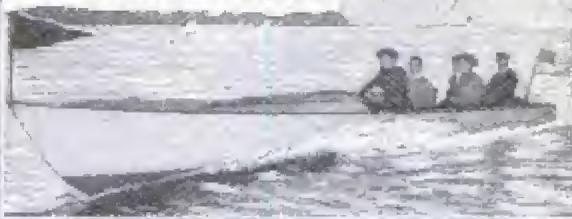
ANY MAN who thought he owned a speed boat and tried last year to "clean up" the Racine-Muskegon 25 Foot Speedabout will vouch for the clean heels of this little beauty. Safe—comfortable—roomy—yet with speed written all over her, she will delight the heart of the lover of motor boats.

We have fitted a few—just a few—of these boats with a powerful 4 cylinder-4 cycle, 20 H.P. automobile type, magneto equipped engine and we are going to sell them to a few fortunate early buyers at a price that will be one of the surprises of the boating year. Here is a boat that will do her 20 miles at the price of a family launch, built in the Racine way, with Racine style and perfection of appointments, backed by the Racine Guarantee. It's your opportunity. Write now for our **SPECIAL OFFER**. Only a few boats at the price. Send now, or better still, send or wire a small deposit and we will hold one for you.

Racine Boat Manufacturing Company
Dept. 38 Muskegon, Mich.

Salesrooms—Chicago, New York Philadelphia, Boston,
Buffalo, Detroit, Seattle

Member National Boat & Engine Co.



LABELING TOWNS—M. Quinton, president of the National Aerial League of France, has proposed a means by which towns and villages may be marked in such a way that airmen in flying over them will be able to identify them without much difficulty. He points out that even if the names were inscribed on a flat roof in large letters the aviator would still have to search for the place on his map before knowing where he was.

He therefore proposes that every notable place, town, village, factory, etc., should be designated by two num-

\$1000.00 IN PRIZES

Before the boating season opens

POWER BOATING

will distribute \$1000.00 in prizes

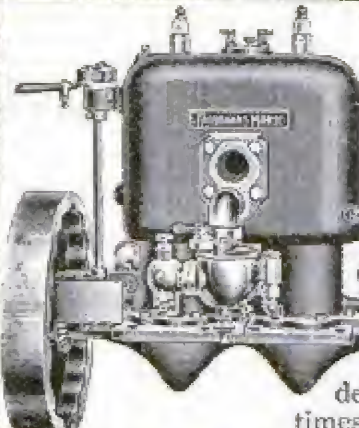
Including 20-foot Mahogany Runabout, 16½-foot Power Dory Skiff, 3 H. P. Marine Engine complete with reverse gear, High Tension Magneto, Batteries, Running Lights, Tool Kits, etc. Also several \$100.00 cash prizes.

You can get one. SEE APRIL

POWER BOATING

on sale at all newsstands or write

PENTON PRESS, CLEVELAND, O.



**It's the Motor
That Makes
The Boat**

Put a Fairbanks-Morse Marine Motor in your boat and you will have dependable power at all times and in all weathers.

FAIRBANKS-MORSE

Marine Motors Are Absolutely Guaranteed

They always run satisfactorily and develop more than the rated horsepower. They can be depended upon to take you "there and back" every time.

Always easy to start without a crank. Best designs, material and workmanship. We build engines for all crafts, large and small. Two cycle 3½ to 24 H. P., 4 cycle 4½ to 40 H. P. Send for Catalog No. 449BY and list of our 36 branch houses where our motors are carried in stock.

Fairbanks, Morse & Co.

481 Wabash Ave., Chicago 30 Church St., New York

A Very Attractive Proposition to Agents.



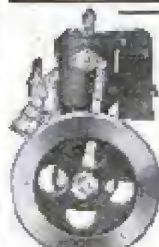
**T & M
MARINE ENGINES**

Have led for 16 years in efficiency, dependability and consistent service. No engine so economical—so correctly designed and constructed. Made in all styles and sizes—2 cycle—2 port type—2 to 120 H. P. All are reversible and

START WITHOUT CRANKING

Boating is a real pleasure when your boat is T. & M. equipped. Compare the T. & M. with other makers—convince yourself of its durability. There is no engine sold at anywhere near the price embodying the same quality of material and workmanship. Write for catalog and name of nearest dealer


TERMAAT & MONAHAN CO.
Dept. "A", Oshkosh, Wis.



3 h-p. Gile Boat Engine \$42
Bronze Propeller and Stuffing Box included
30-Day Trial

Famous on the great Lakes and Both Coasts. Guaranteed as specified, or money refunded. Catalogue gives every detail of materials and build, and tells why we sell so low. Write for it and testimonials. Equally low prices on 5, 6, 10, 15 h. p.

Special Offer to Demonstrators
Gile Boat & Engine Co., 301 Filer St., Ludington, Mich.



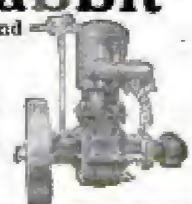
"Runs Like A Scared Rabbit"

Writes Cleburne Grady, Montgomery, Ala., who while yet a green hand at motors averaged 12.52 miles per hour on a 8.62 mile river trip.

Perfection Marine Motor

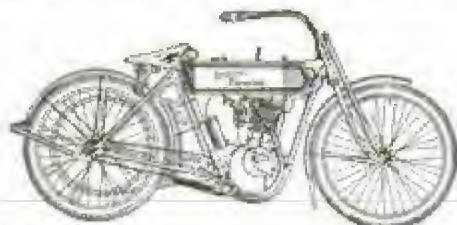
The "Perfection" is so worthy of the name it needs little attention. Just a regular flow of gasoline and a good spark will keep it working on hard towing, ferrying or pleasure jaunts—and it will last as long as

Write for catalog. **CAILLE PERFECTION MOTOR CO., 105 Caille St., Detroit, Mich.**
Send for our Stationary Kerosene Engine Catalog if interested



The Harley-Davidson Motorcycle AS A MONEY SAVER

A good motorcycle would really save you money. You can operate it for from $\frac{1}{10}$ to $\frac{1}{5}$ cents per mile,—less than your present car fare.



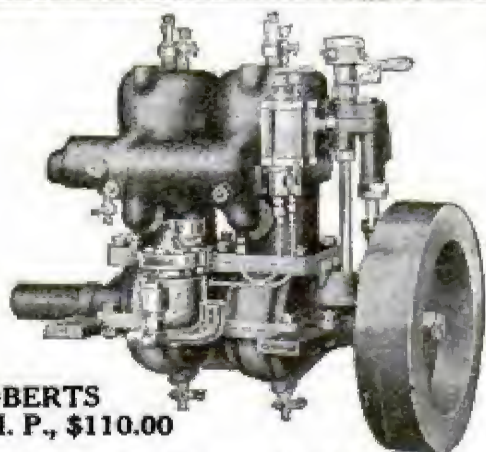
It would mean lunches home, quick pleasant trips to and from work and many a delightful trip to the country. But above all, it means an actual saving in transportation cost to you.

See our agent. If you don't know him, drop us a line and we'll send him to you.

HARLEY-DAVIDSON MOTOR CO.
104 L. St., MILWAUKEE, WIS.

ROBERTS

The Motor That Never Backfires



ROBERTS
6 H. P., \$110.00

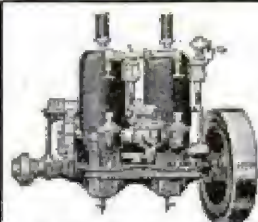
It weighs only 135 pounds. We make them up to sixty weighing 700 pounds and listing at \$900.00. All sizes between.

**Marine Motors, Aeroplane Motors
and Motor Air-Compressors**

Don't fail to get our catalog before you place your order. A postal will bring it free of charge.

—WRITE US TODAY—

THE ROBERTS MOTOR COMPANY
1419 Columbus Avenue, SANDUSKY, OHIO



Toledo

**MARINE
MOTORS**

SIMPLE — RELIABLE
**HIGH GRADE GUARANTEED
MOTORS AT LOW PRICES**

6 H. P., 1 cyl., \$ 84.00
12 H. P., 2 cyl., 155.00
18 H. P., 3 cyl., 250.00

Including complete engine
and electrical equipments.

2 cycle, 2 port $4\frac{1}{2}'' \times 4\frac{1}{2}''$

Send for Catalog "C"

Universal Machine Co.
Palmwood Ave. TOLEDO, OHIO



bers. The first of these numbers would indicate the distance north or south of the parallel of latitude of Paris, the second the distance east or west of the meridian of longitude passing through Paris. Thus if an aviator passed over the sign marked plainly on the ground "168—53," he would know he was 168 kilometers north of Paris and 53 east of Paris. The numbers would be underlined to distinguish north from south and east from west.—New York Sun.

Get This Power Boat at Maker's Prices

BUY DIRECT FROM MANUFACTURER AND SAVE DEALERS' PROFITS



This Toppin Power Dory as illustrated above is made of best guaranteed materials and is the standard rough water boat of the

world. Safe and reliable—used by U. S. Government in all departments. Send 4c in stamps for catalogue. Ask for prices and facts about Toppin Reversible Motors, built with 2, 3, 5, 8 and 12 Horse Power—and if you want to build your own dory, saving exactly HALF, ask for FREE KNOCK-DOWN BOAT QUOTATIONS. **TOPPIN BOAT MFG. CO.** 8 Haverhill St. BOSTON, MASS.

This Magnificent Steel Launch



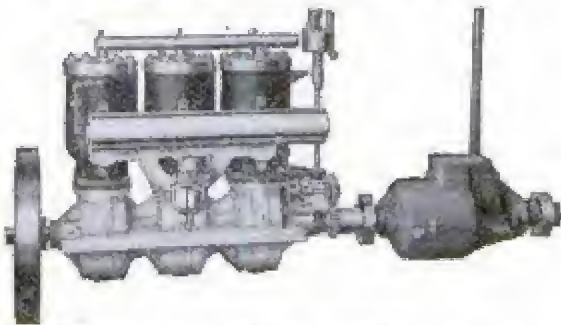
**Stylish 16-Footer Fully Equipped
with Engine Ready to Run!**

\$96

1911 models of the Michigan Steel Launch are now ready for delivery at the lowest prices quoted on boats anywhere. Our special low price schedule for immediate orders covers every launch we make—16, 18, 20, 23 and 27-footers. All sizes in stock for immediate shipment. We are the sole owners of patents covering rolled-steel constructed boats. This construction lasts practically a lifetime. We have the only construction that has successfully made the terrific trip through Grand Canyons of Colorado and Arizona. Write for booklet describing trip. Gold medals awarded our Boats and Engines by Royal Imperial Tech. Society, St. Petersburg, Internat'l Exposition, Milan; Nat'l Motor Boat Show, Paris. **Equipped Bow and Stern with Air-Tight Compartments. The Non-Sinkable Boat—Absolutely Safe! Needs No Boathouse.** Leave your Michigan Launch in the water or out on the beach in all kinds of weather for months. It is puncture-proof. Equipped with the wonderful Detroit Engine, guaranteed for five years, any horse-power from 2 to 50. Fewest moving parts of any engine made. Anyone can run it. Free fully illustrated catalog shows all 1911 models. Don't buy a launch until you see this book. Write for special proposition and prices to Demonstrator Agents. **STEEL ROWBOATS, \$20.** Need no boathouse. Big money in boat livery.

MICHIGAN STEEL BOAT COMPANY, 1271 Jefferson Avenue, Detroit, Michigan, U. S. A. (77)

THE RIGHT ENGINE FOR YOUR BOAT



THERE'S a vast difference between *almost* the right motor to fit your hull and exactly the right one.

Our line is so varied that we can give you the engine *exactly* suited to your needs whether you want to run a towing boat or a racer.

ELBRIDGE MARINE ENGINES

are simple, economical, efficient. They have more power for weight and bulk than any others. Everyone covered by an *unlimited* guarantee.

Our 1911 Catalogue is **FREE**. Send for it.

ELBRIDGE ENGINE COMPANY
62 Culver Road ROCHESTER, N. Y.



Auto Craft

18 Foot Special \$200

A trim, fast, handsomely equipped pleasure launch that is dry, safe and seaworthy. It leaves a clean wake with but little drag or disturbance of the water and is without doubt the fastest boat of its size built. Length 18 ft., beam 4 ft. 6 in. Seats 8 persons comfortably. Speed 8 miles an hour. Equipped with Ferro 3 H. P. engine. Metal air chambers under decks fore and aft (like a life-boat) insure absolute safety. Auto Craft silencer eliminates all noise. Has outboard gasoline drain.

We guarantee Safety—Silence—Speed—Comfort—Durability—Satisfaction. Every Auto Craft launch is built on honor.

No other boat builder can build as good a boat for \$200. Let us tell you "WHY" before you decide. It will pay you to do so.

WRITE QUICK FOR FREE FOLDER

that illustrates and describes the Auto Craft Specials, or send 10 cents postage for our Big Boat Catalog that gives detailed specifications of our complete line of craft, including:

- 21½ ft. Auto Craft Special (4 H. P. Ferro and Reverse Gear) \$300
 - 24 ft. Auto Craft Special (8 H. P. Ferro and Reverse Gear) \$450
 - 25 ft. Gentleman's Auto Craft Runabout, (11 H. P. Ferro and Reverse Gear) \$775
- AND MANY OTHER INTERESTING MODELS

The Cleveland Auto Boat Mfg. Co.
1048 River Ave., N. W., CLEVELAND, OHIO, U. S. A.
DEALERS IN ALL LARGE CITIES

LEARN TO TALK WELL

To be a successful Banker, Business Man, Real Estate Operator, Salesman, Lawyer or Clerk—

HOME STUDY you *must* know how to present your proposition effectively—tersely—quickly.



Senator Depew,
Vice-President.

The practical principles of our course in Oratory and Argumentation have helped hundreds of men to increase their incomes. Why not you? Easy Payments. Small cost. The Founders of this National School include late David J. Brewer, U. S. Supreme Court; Edward Everett Hale; Hon. Martin A. Knapp, Chairman Interstate Commerce Commission; Senator Chauncey M. Depew. Ask for booklet.

Intercontinental University

1423 H. Street, N. W., Washington, D. C.

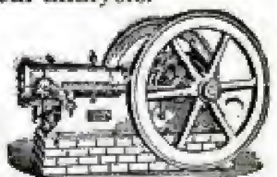
FOOS The Engine of Steady and Reliable Service

Maintaining uniform speed and lowest fuel economy under the most variable conditions of actual work. The Ignition, Counterbalancing and Governing of Foos engines will stand the most rigid technical analysis.

Sizes 2 to 500 Horsepower

Quickly convertible from Gas to Gasoline

Types horizontal or vertical. Single or multiple cylinder. For description of many exclusive features of design refer to Catalog 50.



THE FOOS GAS ENGINE CO., SPRINGFIELD, O.

Largest Exclusive Gas Engine Factory in America

MULLINS Steel Motor Boats

Simply *can't sink*—air chambers like life-boats. Hulls of *puncture-proof* steel plates—can't warp, waterlog, crack, split, dry out or open at the seams. Unlike wooden boats, they cannot leak. Can't be gnawed by worms. Have light, simple, powerful motors, that won't stall at any speed—*start like an automobile engine*—ONE MAN CONTROL and famous Mullins Silent Under Water Exhaust. **12 models**—16 to 26 ft., 3 to 30 horse power.



Handsome Boat Book—Free

Send to-day for *handsomest boat book* ever printed. Illustrated in colors. Details of famous Mullins line. Amazing prices this year. Investigate. Get free book.

THE W. H. MULLINS CO., 151 Franklin St., Salem, Ohio

**Complete Line of Row Boats
and Duck Boats—\$22 to \$39**



The curve cut
strop gives the
barber's
stroke

100
buys the

GIBFORD
ZIGZAG
AUTOMATIC
STROPPER



Complete with Fine Horsehide Strop.
One Model Stropps Every Standard Make
of Safety Razor Blade.

Slip the blade into the holder, move it back and forth a few times and presto!—you have a blade ready for a luxuriously clean, easy shave—no more dull blades, no more expense for new blades.

The ZigZag completes your shaving outfit. Easy to buy, easy to use, easy to carry with you when you travel. The strop is made of fine horsehide by experts in our own factory. The large loop at end of strop makes it convenient to hang anywhere. You pay much more for stroppers that will not do the work nearly so well as the ZigZag. Sold by leading druggists, hardware and other dealers in U. S., \$1.00; in foreign countries, \$1.50, or sent prepaid from factory on receipt of price. Send for free booklet, "No More Dull Blades for Me."

GIBFORD SPECIALTY CO.

63 East Fort Street
Detroit, Mich.



You MUST Know BUSINESS LAW



to attain poise and power and succeed in business—to avoid costly mistakes, to safeguard the interests in your care. Every transaction involves some point of business law. A knowledge of it brings confidence, advancement, profit, success. Our course is for all men, employer or employees. Fits every business. Inexpensive, simple, thorough, easily mastered in spare time.

Learn Why This Knowledge is Essential to a Business Career and to your Success.

Send for our **FREE** book, "Business Law: A Practical Guide," an inspiration to a harder fight, and free particulars of our course.

BUSINESS MEN'S ASSOCIATION,

The Largest Institution of Its Kind in the World.

345 Curtice Building.

Kansas City, Missouri.

SCRIPPS MOTORS

Break away from thoughts of the office, the shop or the store and put your mind for a few moments on the sunny days in the open that are just waiting around the corner for the man with a motor boat. No matter how many cares, no matter how thick the worries come, the wind that blows across the bows of your little craft will sweep them all away.

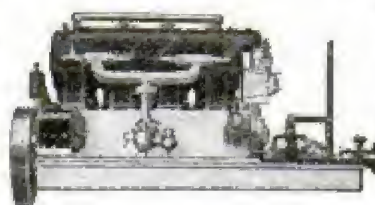
Of course, there's one care that comes to some boat owners, the care of a balky engine. But a little thought now can save you all the trouble that might spoil future days of delight.

The way that SCRIPPS owners speak of Scripps Motors—the careful, unusually painstaking attention given to every detail of their construction makes us positive that you can get no better engine. But, don't take our word for it. Look over a

SCRIPPS MOTOR

before you buy. Send for the Scripps catalogue and learn how well and how carefully they are made. Let us tell you the name of the nearest Scripps dealer—and then have a talk with him. After that—don't let what we say influence you—use your own judgment. We believe your judgment will say—"I'll buy a Scripps."

Drop a line to us today—right now—for a catalogue.



SCRIPPS
MOTOR
COMPANY

650 Lincoln Ave.
Detroit, Mich.

NAVIES OF THE WORLD—A report issued by the British Navy Department on the navies of the world gives Great Britain a tonnage built and being built of 1,871,000; France, 801,000; the United States, 770,000; Germany, 693,000; Japan, 445,000; Russia, 320,000; Italy, 284,000, and Austria, 143,000. The Navy Department excludes all vessels over twenty years old, unless they have been re-armed and re-constructed since 1900, and also vessels authorized but not actually begun. Great Britain is credited with having 53 battleships built and being built of a tonnage of 887,000, the United States with 29 of a tonnage of 406,000, France with 24 of a tonnage of 337,000, Germany with 28 of a tonnage of 354,000, and Japan with 13 of a tonnage of 191,000.—Philadelphia Inquirer.

\$4000 A YEAR TO AGENTS

100 good honest agents—salesmen—managers wanted at once. No experience required. Positions pay from \$50 a week to \$4000 a year. McGough, O., made \$160 in one week. Boy of 14 sold six in one afternoon. E. J. Durr, Mich. cleared \$22.50 in one day. Needed in every home, office, factory, public building. 150 per cent profit in each sale. Profits count up fast. Sale after sale is made in short time. 100 appointments in fine territory will be made at once. If you hurry you can get one of them. Don't waste time. Write us today. Agents recently appointed report startling records of sales. We are introducing one of the most marvelous and useful mechanical and chemical inventions of the age.

A WONDERFUL FIRE EXTINGUISHER

Puts fire out like magic—has created great sensation. Acts instantly—harmless to everything but fire. Cuts cost of fire insurance. Everybody is in mortal fear of fire. Live in dread of it. Gasoline—oil—gas stoves explode every day—children play with matches—lamps tip over. Fires start in hundreds of unexpected ways. Before help arrives homes are ruined—property destroyed—lives lost. Just a little blaze starts it. U. S. Fire Extinguisher prevents all this. **DEATH TO FIRE!** no matter how started. When fire breaks out, grab Extinguisher, throw contents into center of blaze. Presto!—fire out—property—home—lives saved. Write quick. Get in your application. Try for this big money. Honesty and hustle all that is required—address

UNITED MFG. CO., 1548 Mill Street, Leipsic, Ohio.

Reference, Bank of Leipsic, Capital \$1,000,000.00



WETMORE Adding Machine

An Opportunity to Share in the Profits of this Company

THE Wetmore Adding Machine Company will manufacture the simplest, most reliable, and durable adding machine ever produced. Those who organize the company are men of long and successful experience in manufacturing, and their interests are permanently bound up with those of the company.

The Wetmore Adding Machine is the only adding and listing machine ever produced whose addition does not depend upon springs, gravity, or friction. Every part in its adding mechanism is driven into position by cam, gear and lever.

A Few Prominent Features

1. Accumulators in direct line of sight.
2. Low key board.
3. Visible works.
4. Keys interlocking or flexible, at choice of the purchaser.
5. Especially convenient angle of keyboard.
6. A new and improved method of inserting paper.
7. Lightest operation of any machine on the market.
8. All keys and levers operated by the right hand, the left being free for turning checks.
9. Two sets of accumulators, one for the debit and one for the credit column, a feature which greatly extends the usefulness of the adding machine.
10. Positive operation; must add right or stop, no other alternative.
11. The design permits of substantial construction.

Eight years ago, the inventor, Mr. Wetmore, was engaged by one of the largest adding machine companies as their General Superintendent. At that time, the company had almost no factory equipment. Mr. Wetmore first undertook the redesigning of their machine and his name appears on the late patents. Next, Mr. Wetmore superintended the designing and building of the special equipment, selecting and installing the standard machinery and superintended for five and one-half years the production of what is known as one of the best adding and listing machines on the market today.

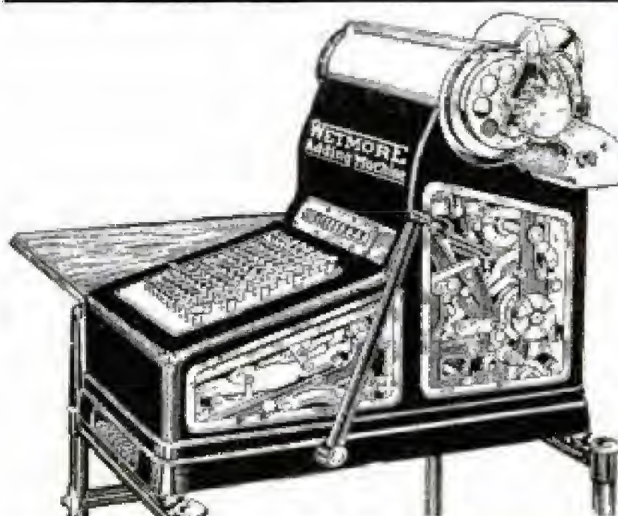
This five and one-half years of building adding machines for the market gave Mr. Wetmore an opportunity to carefully study every other adding machine and this experience convinced him that all adding machines up to this time were designed upon wrong principles.

No one would think of driving a cyclometer on an automobile with a belt. Why? Because belts slip. Why then trust your accounts to a mechanism whose accuracy depends upon its parts being moved by springs? If the spring weakens or the joint in the part becomes corroded or gummed with bad oil or clogged with dirt, you have an incorrect addition.

These troubles led Mr. Wetmore to spend years of time to produce an adding machine whose operation is as positive as a gear drive. If one part in the adding mechanism moves, all the rest must move. If one part is blocked, all parts are blocked. These are features embodied only in the WETMORE ADDING MACHINE.

The Wetmore Adding Machine Co. offers the following very liberal proposition to small investors. We will sell four shares, 7 per cent cumulative preferred stock, par value, \$100.00 per share, for \$400.00. This stock carries a bonus of two shares of common stock. This is the same proposition which is now being made to large investors. This common stock should pay

Not a Spring in Adding Mechanism



More Work with Half the Mechanism

at least 90 per cent when the factory is selling 3,000 machines per year. In addition to this, for the purpose of introducing our machines into every state in the United States, we will give to a limited number of purchasers of the above amount of stock, in each state in the United States, ONLY, an order on the factory for one of our \$400.00 adding and listing machines upon payment of \$200.00 in cash. If the stockholder wishes he may turn in his two shares of common stock in place of paying the \$200.00 in cash, that is, we will accept this common stock at par for payment on this limited number of machines.

For \$400.00 you get \$400.00 of 7 per cent cumulative preferred stock, \$200.00 common stock, and by paying \$200.00 in cash additional, you get a \$400.00 adding and listing machine. Or for \$400.00 you get \$400.00 7 per cent cumulative preferred stock and one \$400.00 adding and listing machine.

Wetmore Adding Machine Co.
211 Grand Avenue MILWAUKEE, WIS.

COUPON

Wetmore Adding Machine Co.,
211 Grand Ave., Milwaukee, Wis.

Please send me complete information regarding the proposition you advertise in April POPULAR MECHANICS Magazine and reserve for me one of the machines which is allotted to this State, pending my investigation. It is understood that if I am not satisfied in every respect with your proposition there is no obligation incurred.

NAME

ADDRESS

"I Made \$20 Today"

Sold 48 This Week, profit \$88.80,
Writes M. G. Clark, Mont.

"WOMEN BUY AT SIGHT"

Vibration Does the Work



"Started yesterday; sold 10, and today 12 more. It's a gold mine. Rush 50 more," writes J. H. Hodson, N. Y. Hundreds of men and women making \$50 to \$100 a Week

actually making a week's wages every day. They're banking money, buying homes, automobiles. New discovery makes it easy for them—will do the same for you. Tremendous sale of the

Home Comfort Scrubbing Machine

breaks all records. New, popular, irresistible—double your money every sale. Every housewife a customer. World's greatest labor saving invention. No more back breaking, floor scrubbing days. New marvelous machine replaces hands, brushes, rags, buckets for scrubbing. **Vibration does the work.** Scrubs, attacks dirt, dust, grease—works like magic. A God-send to women. **Self feeding, self sudsing.** Turns scrubbing drudgery into neat, easy, quick, pleasant task. **Child can do it the Home Comfort way.** Weighs 8 pounds. Sells for \$3.25—lasts for years. **Not sold in stores. Home Comfort is truly a never ending household boon.** Please, astonishes all. Customers wonder how they ever got along without it.

Mrs. Harris, Ill., writes: "Home Comfort has been a God-send. It's so easy to scrub and clean. Really wonderful how quick it works."



\$3.25

Mrs. H. Cole, N. Y., writes: "I am simply delighted. Robs scrubbing of all its hard work and takes so little time. Can scrub dirtiest floors with scarcely any effort." C. Barnes, S. C., writes: "No other invention means so much to the home. I am booking orders like lightning. It takes every woman by storm." What woman hasn't been eagerly waiting for the Scrubbing Machine? It's here—perfected—selling like wildfire. Sells for \$3.25—banishes forever woman's worst torture. Could anything be more appreciated, popular, irresistible? Don't delay—seize this live opportunity. Be first—get exclusive territory—make a fortune. Send today for agency, free sample and credit terms.

SANITARY SUPPLY CO., Box 264, Sta. F, TOLEDO, OHIO

BOOK OF PIANO TESTS

Read this book and you will know how to tell a good piano every time. This book explains the **INSIDE** facts about soundboards, action, cost of woods, nickel used in strings, how to detect **FRAUDS** in piano making, etc., etc. The New York World says: "A book of educational interest everyone should own." With this book we send free latest circular illustrating the high grade Wing Pianos (the only pianos sold direct from our exclusive piano factory), and saving ALL middlemen's profits. Send for this **FREE** great Piano Book today—free prepaid.

WING & SON 9th Ave., and 13th St. Dept. 1194, New York



BOOKS THAT REALLY TEACH

you the things you want to know, and in a simple, practical way that you can understand.

Our illustrated catalogue, which will be sent you free upon request, tells all about the Practical Mechanical Books for Home Study that we publish. No matter what your ambition or desire for knowledge may be, we publish books written by authorities in their different lines that will give you just the mechanical training and information that you want and need. Write today for this up-to-date and complete illustrated catalogue and popular price list. It is free.

FREDERICK J. DRAKE & CO.

PUBLISHERS OF SELF-EDUCATIONAL BOOKS, 1327 MICHIGAN AVENUE, CHICAGO



Under YOUR Hat

Lies Much Undeveloped Power—
Much Idle Money-Making Force

You can make more money with your Brain than you can with your hands. But you must cultivate it. Just as surely as a bushel of seed corn properly cultivated will produce a hundred bushels of corn, so surely will each dime devoted to **BRAIN-TRAINING** yield a thousand dimes in business.

Let us tell YOU something about this idea of money-making; how YOU can quickly make from \$500 to \$5,000 more per year than you are now making; how we can place a big money-making opportunity right in your own hands, at your own home.

Send postal for free booklet, "The Stairway to Opportunity"

This message is for the man in the rut—Clerk, Bookkeeper, Salesman, Bank Employee, Business Man, Factory, Store or Railway Employee—Anyone with a genuine ambition to make more money.

COLLEGE OF INVESTMENTS, INC.
500-509 Parkway Bldg., PHILADELPHIA, PA.

MUSEUMS OUT OF DATE—Dime museums have not thriven lately, and most of them have become extinct. Their freak tenants, however, have not passed out with them. Many of them have been taken over by that grab-bag, the modern stage. Real Indians,

The Right Kind of Exercise

The only kind of exercise recommended and taught by me is exercise which is at all times just within the strength of each muscle or muscles employed. Never go so far as to overwork a muscle, external or internal, but make it do all that can be done comfortably. It is the wise provision of Nature that every muscle hold strength in reserve for emergencies. Thus, if a muscle be accustomed to exert every little while a pull of 50 pounds, Nature will provide that muscle with the power to pull 60, 70, perhaps 80 or 100. If the work is increased, so will the muscle strength increase in exact proportions. This is absolutely true, as Nature is never neglectful of her duty. The **Right Kind of Exercise** in physical training may be had by the use of my **PROGRESSIVE EXERCISER**. A machine with which you can uniformly exercise every muscle of the body. By combining the use of this wonderful invention with my instructions on health and strength building, you will not acquire an abnormal development, but your entire body will be uniformly benefited. My most recent book **The "WHYS" of Exercise** tells all about this wonderful little exerciser. It also tells many truths about exercise which are startling to the average reader, giving as it does the "reasons why" so many systems fail, and proving conclusively that there is but one way to acquire **REAL HEALTH AND STRENGTH**. In sending for book enclose 4 cents in stamps to cover postage. My price for machine and complete course of instructions is extremely reasonable.



Prof. Titus in a powerful neck and back exercise.

Prof. H. W. Titus, "THE HERCULES OF ALL SYSTEMS"
303 Titus Bldg., 156 E. 23d St., New York

12 Art Panels 50c.

Reproductions of Famous Paintings
"Of Woman Beautiful"

Best ever shown in one collection. A full set of 12 in a handsome Art Portfolio, packed flat and safe delivery guaranteed, with 120 life-like miniature illustrations of beautiful art pictures, for only 50c coin, money order or U. S. stamps. Send at once. Money back if not satisfied.

FLORENTINE ART COMPANY
Dept. U4, 2009 Prairie Ave., CHICAGO, ILL.
FREE Order at once and get "FREE" a beautiful den picture in colors.



POTMEND The Universal Mender

MEND WITHOUT HEAT

Potmend is the most powerful cement in the world. A great help around the Repair Shop, Tool-House, Factory.

Most Excellent for General Repair Work

Most useful for manufacturing purposes.

The longer you use
POTMEND
the more uses you will find for it



Potmend is a dry Powder Cement that will never deteriorate—never harden in the can. Most economical to use. No cure-all, but a practical, scientific preparation.

Potmend will stick solidly different substances, such as Brass and Glass, Marble and Wood, Silver and Glass or Bone or Cork, Iron and Glass, Leather and Metal, and so through any combination you want to make.

Try it once and you will never want to be without it.

You owe it to yourself that you at least will test this wonderful cement. Potmend will save you money.

To introduce Potmend, we will send by mail, postage paid, to any part of the United States and Canada, our "Factory Size" can upon receipt of \$1.00. Quantity prices and terms given upon application. We will not send any free samples but do guarantee our cement to be as represented.

If, for any reason you are not satisfied with POTMEND, return it at our expense and we will return your money.

POTMEND CO., INC., 305 West 24th Street, NEW YORK, N. Y.
Telephone: Chelsia 6006 Cable Address: Potmend N. Y.

CUT OUT AND MAIL TODAY:

**Potmend Co., Inc.,
New York, N. Y.**

Gentlemen: Enclosed find \$1.00 for which send me one can of Potmend—factory size. If for any reason I find Potmend unsatisfactory, I shall return it at your expense and you agree to refund the money.

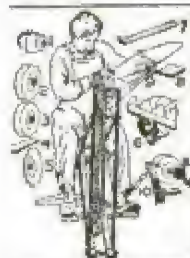
NAME

STREET AND NO.

CITY

STATE

giants, dwarfs, very fat men, very thin men—you find them all appearing in vaudeville and more or less "legitimate" plays in the metropolis today. Musical comedy and burlesque share between them the distinction of exploiting a class of humor whose buffoonery and inhuman, or subhuman grotesqueness are best fitted to a dime museum environment.—New York Mail.



TRY IT FREE

10 machines in one. Handiest tool on the farm. Has 10 Alectride grinding attachments. Takes rust off tools and sharpens them 25 times faster than sandstone. 8 times as efficient as emery. Does not draw temper. High speed and easy running. Write for free trial. Positively no money down. Send postal for free booklet today. **Harman Supply Co.** 160 Harrison St. Dept. 1194, CHICAGO



\$12 to \$40 A WEEK

can be added to your income in spare time growing mushrooms entire year in cellars, sheds, boxes, etc. Sell like hot cakes 50 cents to \$1.25 per pound.

Free Illustrated Instruction Booklet

HIRAM BARTON

Desk 2, 329 W. 48th St., New York

We Undersell Everybody on Everything in Guaranteed Plumbing and Steam Goods



First Quality Bath Tub, \$13.85 up

JOHN HARDIN COMPANY

Dept. P.M. Quarter Century at 4543 Cottage Grove Av., CHICAGO
PROMPT DELIVERY PHONE OAKLAND 397

L. C. SMITH & BROS. TYPEWRITERS writing in sight.



Low Prices to Kill the Boat Trust!

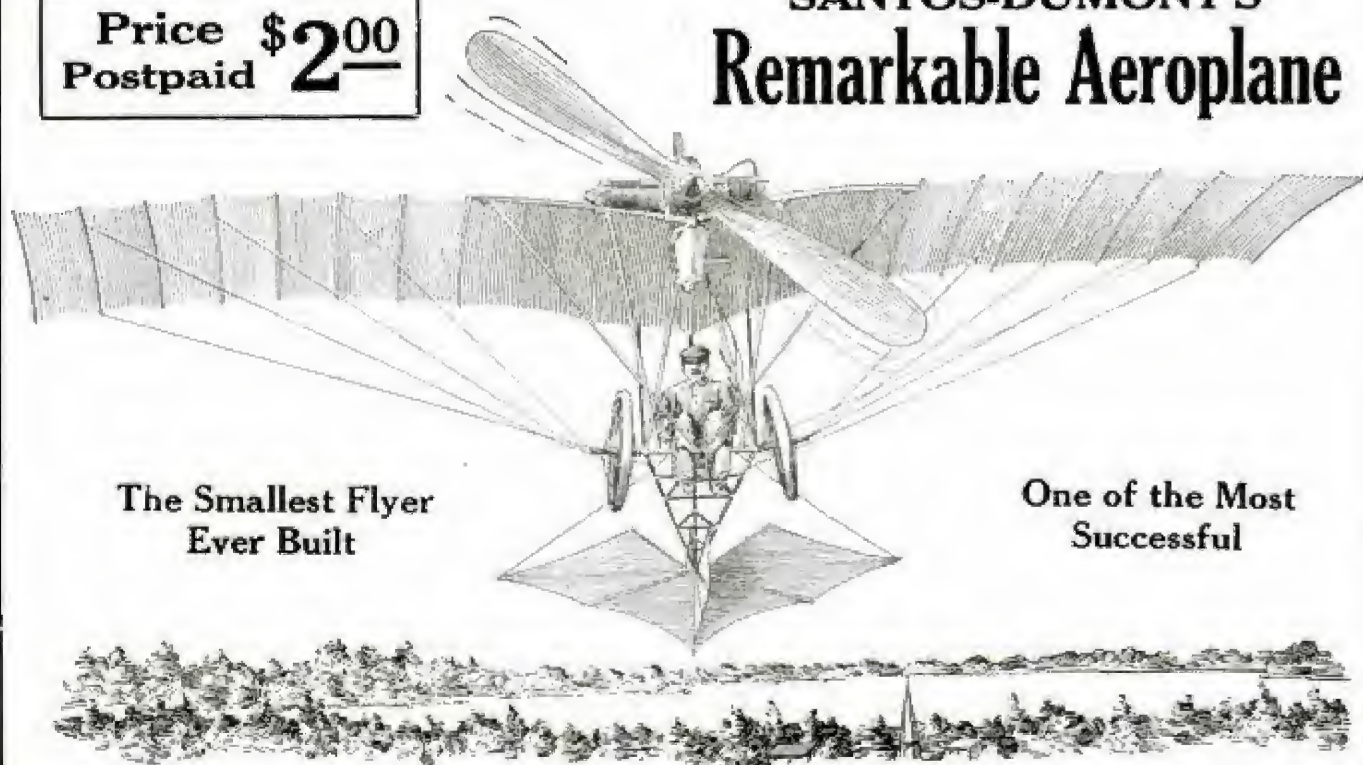
This Handsome, Graceful, Seaworthy, Speedy Runabout Complete, Only \$94.50 16, 18, 20, 21, 23, 25, 27, 28, 30 and 35 Footers at Proportionate Prices. We have the largest power-boat factory in the world. We build and sell more pleasure crafts than all the concerns in the Authorized Thirteen-Million-Dollar Boat Trust combined. No one has such facilities. That's why we build Detroit Boats and Engines so good that no one in the Trust can ever imitate them. Our great business enables us to sell at the smallest profits. That's why we are able to sell Detroit Boats and Engines at the smallest profits, so the Boat Trust has declared war on us—

but our low prices will kill the Trust. We ship you a Detroit Boat immediately on order. All sizes in stock. Send today for our large, handsome, illustrated Catalog, mailed free, which describes 64 different models in all sizes, ready to ship, equipped with the most reliable and efficient marine motor ever produced, guaranteed for five years. Get our new confidential proposition and special prices to demonstrating agents. (114) **DETROIT BOAT COMPANY, 1100 Jefferson Avenue, Detroit, Michigan**

Working Drawings of the "Demoiselle"

Price \$2⁰⁰
Postpaid

SANTOS-DUMONT'S
Remarkable Aeroplane



The Smallest Flyer
Ever Built

One of the Most
Successful

Complete plans for the construction of the wonderful monoplane offered to the public for the first time.

The machine is unencumbered by patent rights, the famous aviator preferring to place his invention at the disposal of the world in the interest of the art to which he has devoted his life. These plans were secured by representatives of Popular Mechanics from Santos-Dumont, and are the result of consultations with his engineers and observations made at his workshops.

How the "DEMOISELLE" Ranks With Other Machines

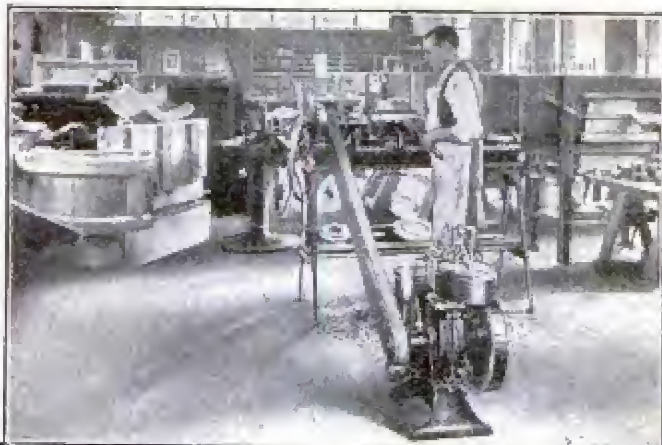
From New York Times, October 9, 1910.

"M. Garros, famous French aviator, uses a Demoiselle aeroplane, the invention of Santos-Dumont, which has proved to be one of the most interesting types of flying machines in Europe. It has been called the humming bird of the heavier-than-air brood. It is the smallest flying machine in existence, weighing less than 250 pounds. It is capable of enormous speed, and darts about through the air in a way that has provoked both laughter and wonderment from the crowds at the European meetings. Garros is by far the most expert driver of these little machines in Europe. During the past season he has made remarkable flights in various places, but his flights from Pinard to St. Malo, over the water, have been regarded as most remarkable. While these baby monoplanes in the hands of ordinary pilots keep very close to the ground, Garros has driven his machine to great altitudes, and has taken his place in many of the important contests of France with the larger monoplanes."

The set comprises seven large blue prints, showing every detail of construction, accompanied by a description of how to build.

POPULAR MECHANICS COMPANY

225 Washington Street, CHICAGO, ILLINOIS



The MULTI-MOTOR Shop Engine

"Handy as a Pocket in a Shirt"

Get this MULTI-MOTOR going in your shop. It makes machinery hum. It takes the place of *man-power* on many kinds of work. Saves *treadle-pushing* and *crank-turning*. Saves time, money and muscle. Does a big day's work indoors or out for less than a cent an hour.

Little Engine—Big Power!

The engine weighs only 250 pounds. It is an air-cooled, fool-proof Gasoline Engine, *complete in itself*. Important working parts protected by dust-proof crank case. Comes on its own base. Ready to run when uncased. Set it anywhere, fill the tank, oil up and start the engine! Cannot freeze or overheat. Needs no attention while running. The Multi-Motor is the handiest engine ever built. For indoor use has outdoor fuel tank, insuring perfect safety.

Runs All Kinds of Light Machines

Such as jig saws, lathes and all other light machines of shop or farm. Runs small electric lighting plants, water pressure systems, etc.

Power for Less Than a Cent an Hour!

This engine quickly pays its cost in saving of *workmen's wages*. Think of having ample and instantly available power for less than a cent an hour! Consider the great convenience of this little Portable Power Plant.

Guaranteed!

The engine is as high grade in materials and workmanship as best automobile engines.

Every engine guaranteed.

Fuller & Johnson Farm Pump Engine

Fits Any Pump and Makes it HUMP!

Patented in U. S., Canada and other foreign countries. Other patents applied for.

Has a pumping capacity of 400 to 1,000 gallons per hour. No belts, arms, jacks or special platform needed. It is practically the same as the Multi-Motor, equipped for pumping service. Runs all hand-power or foot-power machines.

Engine Book Free! Our Engine Book gives full details regarding both the Multi-Motor and Farm Pump Engine. Investigate the possibilities of one of these engines for your special use.

FULLER & JOHNSON MFG. CO.
4 Partridge Street (Estab. 1840) MADISON, WIS.

If interested in larger engines, ask for Double-Efficiency Engine Catalog. Send today. (244)

Camp Guide

Sent FREE!



Just your name and address on the Coupon below brings

you the new 1911 edition of our famous Camp Guide, absolutely free. The most practical book on camp life ever written. Gives you practical information written by experienced men who have spent years in camps in every part of the country. This camp guide tells you everything you need to know about camping—it tells you how to camp successfully and enjoyably—gives you the information that you could not possibly secure otherwise except by actual and often disagreeable experience.

Get Ready NOW for Your VACATION!

The time for planning is growing short. Go camping. You cannot find a more healthful or enjoyable way of using the time at your disposal.

But when you do go—go right! Send for our new Camp Guide and Catalog the first thing you do. You will find listed and described the largest line of Tents, Camper's Supplies, Sails and Canvas Specialties carried by any manufacturer in the United States. We sell direct from our huge factories to you. You are sure of getting the very highest qualities it is possible to obtain at less than you would have to pay at retail for decidedly inferior goods.

Look at these Wonderful Values



This 7x7 ft. Wall Tent, made of the very best quality 8-oz. Single Filling Duck, cut and made with the most extreme care.

A simply astounding bargain at only **\$5.45**



Family Compartment Tent, 9x16½ ft. Made of the best selected quality of 10-oz. Double Filling Duck. May be divided into rooms for eating and sleeping to suit convenience. Insures

absolute privacy. The ideal tent for family or small party. Specially priced at only **\$22.50**

Now Write for our FREE Camp Guide and Catalog—don't bother with a letter—just

your name and address on the attached coupon will bring you this great book by return mail. Whether you intend going camping this year or not, you should be sure to get this free book at once. You should certainly get our lowest prices, our bed-rock factory prices, on the very finest line of canvas specialties and camper's goods that it is possible to produce.

H.Channon Company

Department 1194

Market and Randolph Streets

Chicago, Ill.

Don't Bother with a Letter

Send the coupon for this FREE book today

H.Channon Company

32 Market Street

Dept. 1194

Chicago

Gentlemen—Kindly forward me free, postpaid, your new 1911 Catalogue and Camp Guide

Name

Address

No letter necessary: just send the coupon

Please Mention Popular Mechanics

All-Wool Clothes Six Months to Pay

34
All-Wool
Fabrics
Samples Free
Suits from
\$12⁹⁵
to
\$35⁰⁰
Sent on
Approval
Tailored
to Fit



College Styles

The smartest spring styles for young men are all shown in the Clement Style Book. We send with it samples of 34 all-wool fabrics in the newest patterns.

Your suit will be made in any style that you like best, and of any fabric. It will be made by expert tailors, lined and inter-lined like suits that cost twice as much. The cloth will be all-wool, London shrunk — cloth that holds its shape and color.

The cost will run from \$12.95 to \$35.00 according to the cloth you select.

A tailor's tape will be sent with the samples, so you can take your own measurement. That saves you one-third under what it would cost if we had a local agent to measure you.

The clothes will be promptly sent on approval, to be returned at our expense for express both ways if you don't find them satisfactory.

If you find them perfect in every way, pay a little each month for six months. No extra price, no interest, no security, no red tape.

Tens of thousands of men have found that Clement clothes save them from 30 to 50 per cent. Better styles, material or tailoring cannot be obtained. Some of the best-dressed men you meet are Clement customers.

Write us a postal for our Spring Style Book and samples. Do this now. The whole outfit mailed free. [14]

THE CLEMENT CO.

3573 Morgan St.

CHICAGO

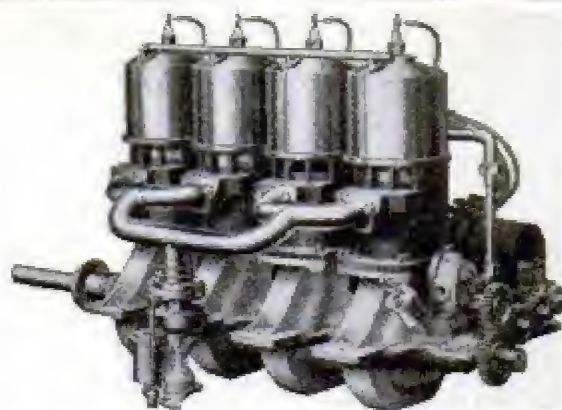
When you want anything and don't know where to find it—
write Bureau of Information, Popular Mechanics, Chicago



She Did It With JAP-A-LAC

Her porch chairs lost their varnish and the wood showed through in spots;
She noticed the enamel had chipped off the children's cots.
The benches in the garden had all faded in the rain,
So she painted them with JAP-A-LAC and now they're new again.

**The Glidden Varnish Company, Cleveland, Ohio
Toronto, Ont.**



Are You Interested in Aeronautics?

Every novice Aviation record in
America has been made with

Elbridge Featherweight Engines

Our "AERO SPECIAL" is even lighter, more powerful, and more reliable than the Featherweight.

Under every climatic condition and for men in every walk of life, the ELBRIDGE has made good. It's a motor that always "notes."

To insure your successful flight, we will furnish propellers that propel and radiators that radiate.

Our new book, "American Amateur Aviation," of vital interest to all who are interested in Aeronautics, sent for six cents postage. Catalogue Free.

ELBRIDGE ENGINE CO. 62 Culver Road
ROCHESTER, N. Y.

Trade-Mark U. S. Registered



10 FOR 10 CENTS Nickel-Plated Push-Pin Hanger

Made of tempered steel in one piece. Nothing to lose, bend or break. Push in wood or plaster wall with thumb or tap with small hammer. Will sustain a weight of 25 lbs. For the Home, Office or Factory, also for Schools and Hotels where the unsightly nail is prohibited. For sale at Hardware, Stationery and Photo-Supply Stores. Sample box of 10 sent prepaid for 10 cents. Liberal Discount to the Trade. Salesmen Wanted

Niagara Metalware Mfg. Co., Buffalo, N.Y., Manufacturers of Hardware Specialties

For Two Cents A Turkish Bath In Your Own Home To Enjoy Regularly



THE delicious sense of refreshment lasts for hours after the bath. When the "Robinson"

Thermal Bath becomes a habit, the user is in a constant state of freedom from "off-days" and "staleness."

Efficient in cases of La Grippe, Bad Colds, Rheumatism, Dyspepsia, and Skin Diseases. All users enthusiastic.

Great \$2 Book Sent FREE—"The Philosophy of Health and Beauty" represents lifetimes of thought of well-known scientists and is written plainly so that anyone can understand every word. Write in time—today.
ROBINSON MFG. CO., 172 Snowflake Bldg., Toledo Ohio



Business—Politics—Spec-
ulation—Turmoil—Tur-
bulence—Trouble—Smoke
"Velvet."—It Helps Out!



"Velvet" is a smooth pipe smoke, in that it quiets the being, mollifies the mind—pleases the senses. It's the Burley leaf with over two years of aging—a mellowness rarely found. Such treatment nullifies harshness—has the bite entirely banished—the pleasure all in.

Pipe smokers—we know your thoughts—we meet them in "Velvet." 10c. at all dealers.

Velvet should be on every dealer's shelf—IF OUT, send us too, for the regular tin—sent only in United States.

SPAULDING & MERRICK
Chicago, Ill.



Special Rock Bottom Offer



On Railroad Watches Recognized as of the Highest Grade.

THE rock bottom price, the very rock bottom on the highest grade movements known of in the world.

EVERY ONE of these special watches is **GUARANTEED TO PASS INSPECTION ON EVERY ROAD** in the United States, Canada and Mexico. **EVERY** watch has **EVERY** point of excellence that is demanded by **ANY** railroad.

The Independent Railway Watch Distributors has been organized to offer these high grade watches at surprisingly special prices to railway men (also to other people on this special offer.)

Please Bear in Mind

that you can get direct at the most remarkable price and terms **YOUR CHOICE** of the most famous brands of watches—railroad timepieces known as the best everywhere—and you get your choice *without* paying the tremendous prices regularly charged. There is no need of arguing about comparative quality—for every watch listed has been passed upon by the railway inspectors everywhere—officially recognized as meeting every possible requirement in the railroad business.

Montgomery Dials, Marking Minutes

This is the new style of dial which both railroad men and others want all over the world.

Your Opportunity

to get the very best on an astounding offer. The reasons for this special offer are explained in the Distributors Booklet. See this coupon. Write today.

Send Coupon

for our book which lists all designs, prices and grades of railway watches.

Independent Railway Watch Distributors

2845 19th St.,
Dept. 1194,
Chicago, Ill.

For Purposes of Quick Distribution on our new plan the terms of **\$3.50 a month** at the **rock bottom price** will be allowed for the **present** to people outside the railroad business who apply at once; by this method we hope to interest the railway men themselves all the more quickly when they see the superior watches carried by their passengers.

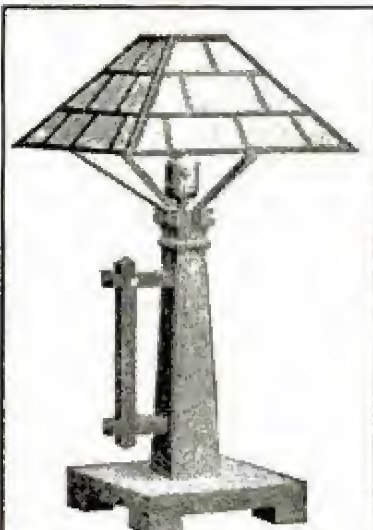
FREE Coupon Railroad Watch Book Sent

FREE listing the rock bottom prices direct (also \$3.50 a month terms.) Address

Independent Railway Watch Distributors
2845 19th St., Dept. 1194
Chicago, Illinois

Name

Address



Portable Reading Lamp

JUST PUBLISHED

Arts-Crafts Lamps

How To Make Them

By JOHN D. ADAMS

16 Beautiful Designs, 25 Cents

AS FOLLOWS:

Two Light Portable—Portable Reading—Four Light Chandelier—Reading Lamp—Dining Room Dome—Porch or Den Lantern—Four Light Chain Hung Chandelier—One Light Portable—Lantern—Drop Light—One Light Bracket—Piano Lamp—Wall Lamp—Electric Candle Sconce—Newel Post Lamp—Chain Hung One Light Bracket.

Plain Instructions—Dimensioned Detail Drawings and Illustrations of Each Finished Design

A handy little working manual of 96 pages, printed on the best quality of book paper and handsomely bound in cloth. Supplied by your newsdealer or may be ordered direct from the publisher

POPULAR MECHANICS BOOK DEPARTMENT, 225 Washington St., CHICAGO

JUST READY

HOW TO MAKE A

WIRELESS SET

By ARTHUR MOORE

A book of 96 pages, bound in cloth, explaining in an understandable manner the construction of an outfit suitable for transmitting four or five miles. This set can be easily constructed at a small cost by any boy of ordinary ability.

Complete details with illustrations

PRICE 25 CENTS POSTPAID

ORDER OF YOUR NEWSDEALER OR SEND DIRECT TO THE PUBLISHER

Popular Mechanics Book Dept. 225 WASHINGTON STREET
CHICAGO, ILL.



Every Ride A Joy Ride

There is no limitation to the pleasure of motorcycling when you ride an

R. S. Motorcycle

"Built and Tested in the Mountains"

You can leave the zone of machine shops with a feeling of safety. You can climb hills that defy the ordinary motorcycle. A twist of the wrist and the **R. S.** immediately responds with any speed you dare ride. The **R. S.** is the only motorcycle in this country with a coaster brake and a foot brake. Make safety doubly sure. The **R. S.** has the simplest, coolest, surest, most powerful little motor ever produced. Most economical, silent and simple. Most comfortable. Most efficient spring seat post and shock absorber, and other exclusive and valuable features. Write for catalog. *Agents wanted.*

READING STANDARD COMPANY

Makers Renowned Reading Standard Bicycles

405 Water St., Reading, Pa.



The Latest Thing in Oilstones



PIKE REVERSIBLE

The handiest and most economical Oilstone contrivance yet originated. Two of the best Oilstones in the world in one mounting. Either stone ready for use instantly. A time and labor saver to the busy mechanic. You cannot afford to be without it. If your dealer hasn't it, send \$2.00 direct to us and your order will be filled without further cost to you.

PIKE MFG. CO., PIKE, N. H.

This Trade Mark is



Your Protection

Send for booklet "Oilstones, How to Select and Use Them," Every mechanic should have a copy.

Why Do Men Fail?

¶ THE SUPREME PROBLEM OF LIFE for you is, *how to get money in sufficient quantity to make you independent before your hair turns gray and your eyes grow dim.*

¶ The struggle for money is "the struggle for existence," and a man can scarcely hope to be victorious therein except in the days of his strength and prime.

¶ We are all fighting for money (because money means nearly all that's worth while), but few there be who attain it.

¶ Now why should that be so? *Why are there so many failures?* The answer is simple: The majority are failures because *they do not think right!* They are in a state of discord rather than harmony with the natural Laws that govern money-making and the creation of wealth.

¶ Is that your case? Is your mind negative? If so, you must seek immediate remedy. You must remove the blight of wrong thinking; and for that purpose we strongly recommend to your attention a *splendid little book*, entitled

"THE LAW OF FINANCIAL SUCCESS"

¶ It is as full of good things as an egg is full of nutriment. It is the essence of money-making boiled down for busy people.

¶ Send for it at once. It only costs ten cents and it will make a new man of you. It will teach you how to be a winner—how to escape the hell of poverty—the worst of all hells.

¶ We honestly declare it is worth no end of money to any man who is desirous of *properly directing* the forces within him for his own enrichment.

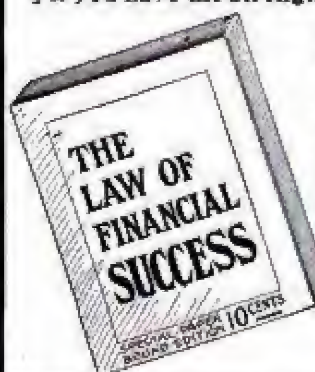
¶ If you have the strength and determination to be a winner, get this book. Get it at once. Follow our advice.

Don't put off till tomorrow what you should do today. Fill in the coupon and the book is yours by the next mail, and it may be the making of you. *If you don't like it your money will be returned; you run no risk.* Special Paper Bound Edition of 16 chapters, 104 pages, only 10 cents. Over 150,000 copies sold.

¶ Don't miss the tide that leads to Fortune.

THE FIDUCIARY CO.

405 TACOMA BUILDING
CHICAGO, ILL.



—WRITE YOUR NAME AND ADDRESS HERE—

THE FIDUCIARY COMPANY.

405 Tacoma Bldg., Chicago, Ill.

Gentlemen: For enclosed 10 cents (stamps or coin) send me a copy of your book "The Law of Financial Success."

Name _____

Address _____

Town _____ State _____

Cut out coupon and mail today

READ THIS WONDERFUL STORY

128 Pages.
Bound in Cloth.
Illustrated.

HEAT

Price
Post-
paid, **25c**

By **J. GORDON OGDEN, Ph. D.,** Professor of Physics, Fifth Ave. High School, Pittsburg

Thoroughly Understandable — Instructive — Immensely Interesting

This book consists of a series of articles, each complete in itself, yet all pertaining to heat and its relation to modern mechanics.

FEW people realize that fire is the most remarkable and valuable discovery ever made by man. Prior to this, man was brother to the brute, but with the coming of fire, came all the wonderful development that has enabled man to assert and defend his claim as lord of creation. We are only in the infancy of high temperature development, yet read of the harnessing of intense heat to the wheels of progress; the contrivances whereby we are able to emulate the volcano in our laboratories so far as heat is concerned and weld steel rails in the street where they lie; the discovery of uses of rare metals in industrial lines by aid of heat. Investigation of the realm of low temperatures also discloses some wonderful facts. All these, and many other phases of this interesting subject are treated as shown by the following list of chapters:

1—Nature of Heat and How It Is Measured. 2—How Low Temperatures Are Produced. 3—Some Effects of Low Temperature Upon Matter. 4—The Production and Uses of High Temperature. 5—High Temperatures and the Rare Metals. 6—How Heat Travels. 7—How Heat Is Measured. 8—Expansion and Contraction. 9—Energy and Fuels. 10—The Manufacture of Artificial Ice. 11—Steam Boilers and Engines.

POPULAR MECHANICS BOOK DEPARTMENT, 225 Washington St., CHICAGO

The Best Book For Beginners

A Practical Course in
By **Wm. F. Willard** **Mechanical Drawing**
POPULAR MECHANICS BOOK DEPT.
225 Washington Street, Chicago

Price 50c
Postpaid

We have for sale a limited number of complete files of

Popular Mechanics for 1909

These consist of the 12 issues of the magazine and a complete index suitable for binding.

Price \$1.25 postpaid

POPULAR MECHANICS, 225 Washington St., CHICAGO

"The How and Why of the Automobile"

By **FAY L. FAURTE.** Price, \$1.00, postpaid.

Did you ever read a book which gave you just the information you wanted without being compelled to go through page after page of introduction and history?

Did you ever talk to a man who came over on your side of the fence and talked WITH you and not AT you—who explained things in such a way that you laughed at yourself afterwards for not understanding the subject before—it was really so simple?

Do you remember when you used to study by outlines, how difficult problems unfolded themselves, how the logical sequence of facts seemed to make what you expected to find hard, readily understandable?

Do you remember the innumerable times you have said to yourself, "If I only had somebody here to explain things—someone who would go through this proposition with me until I understood it—someone who would use homely and familiar examples to explain things, instead of talking over my head by using technical terms?"

The author realized all these difficulties himself, because he has been through it all. Not only that, but his experience as an instructor of a large motor school taught him the way to explain the various parts of a motor vehicle in simple language, so that even the boy of fifteen could understand and appreciate them.

For instance, did you ever think that the physician uses a form of carburetor whenever he gives chloroform or other—do you realize that a shotgun is a form of gas engine whose action is almost identical with that of an automobile motor?

Do you want to know what a sliding gear transmission is—explained in such simple language that anyone can understand it?

Would you like to see what's inside of an automobile engine? Would you like to know the name of every part, be able to talk intelligently about it, and be your own mechanic, tell your chauffeur what to do, know when he is bluffing you?

In a word, would you like to know all about a motor car, how it works, how to drive it and how to take care of it? Then send for a copy of "THE HOW AND WHY OF THE AUTOMOBILE."

Contents.—General Theory of Gas Engines—Motor Design—The Carburetor—Ignition—Cooling System—The Transmission—Methods of Driving—Running Gear—Horse-power Determinations. For sale by

POPULAR MECHANICS BOOK DEPT.,

225 Washington St., Chicago, Ill.



Will
Sharpen
Every
Razor—
Safety or
Old Style

THE NEVER-FAIL AUTOMATIC RAZOR STROPPER

is absolutely perfect and positively guaranteed to sharpen any and all kinds of safety and old style razors. Everything is automatic—self-adjusting perfect. Anyone can operate it—anyone can obtain perfect results without experience. Guaranteed for life.

WANTED AGENTS SALESMEN MANAGERS

I want a good man in every territory of the United States—as local agents for one county, or as general agent for a number of counties. This is a new proposition, and offers an opportunity for you to make from \$45.00 to \$90.00 a week and on up to \$8,000 or \$10,000 a year. I am organizing my selling force now and I want you to begin at once. Write for information today.

\$45.00 TO \$90.00 A WEEK

This is an opportunity I offer to a good man in every territory in the United States. No experience is necessary. **The Never-Fail Strop** sells on sight. I want agents, general agents and managers. Any one can do the work. No charge for territory. Grand, free advertising special introductory plan for agents on the most sensational selling article of the day. Every man a buyer—quick, every call a sale. Success is yours. Money in abundance is coming to you. Independence, pleasant position—luxuries—a start in real life—SUCCESS. Send for reports of our men who are out in the field. Listen to their words of success. Learn of the money they are making. Get out of the rut. Young men, old men, farmers, teachers, carpenters, students, bank clerks—everybody makes money. *One man (Hiram Purdy) took 27 orders first day out.* (Sworn statement); *profit \$40.50.* 26 orders the next day. Once our agent, always a money maker. A. M. Clark, of Kansas, wrote: "I was out of town the other day—did not go with the intention of doing any soliciting. Just got to talking and sold 6 before I knew it." Profit \$9.00. Sales roll up every day.

400,000 IN FOUR MONTHS

I want general agents and managers to handle big territories, employ sub-agents, look after deliveries, advertise and distribute. I will offer you 100 per cent profit. I am organizing my selling force now, and I want you, if you want to make money honestly and rapidly. Exclusive territory given—no charge made. Protection against others running over your field. Co-operation, assistance, personal attention to each man. Complete information free. Investigate.

This is a new proposition. **A positive automatic razor stropper—absolutely guaranteed.** A thing all men have dreamed about. Perfect in every detail, under every test. With it you can sharpen to a keen, smooth, velvety edge any razor—**safety or old style**—all the same. Handles any and every blade automatically. Just a few seconds with the Never-Fail Strop puts a razor in better shape to give a soothing, cooling, satisfying shave, than can an expert hand operator, no matter how carefully he works. New idea. Men are excited over this little wonder machine—over its mysterious accuracy and perfection. They are eager to buy. Women buy for presents to men. Agents and salesmen coining money. Field untouched. Get territory at once. I want a thousand men—young or old—who are honest and willing to work to start in this business at once. Act today. Exclusive territory.

One of our men started in selling in Louisiana. Became general agent, controlling extensive territory. At a single time he ordered 50 agents outfits. This man started without any experience as a salesman; but the Never-Fail Strop caught on so tremendously that he made more money than he ever dreamed of making in his life. No talking is needed. Just show the machine to men and they want it immediately. No modern invention has received such open-armed welcome. Please remember the machine is absolutely guaranteed. It is positively successful under every test and trial. It answers the razor stropping problem of ages. It is a modern invention for modern times, modern perfection and modern men. A half-minute demonstration is all that is necessary.

SEND NO MONEY

Just your name and address upon a postal card and I will mail you complete information, details, description of the business, sworn-to proof from men out in the field. I want you to know what this advertisement means to you. I want you to take a territory and make 1911 the biggest year you have ever lived. All I require is that you stay on the job, keep things moving, and that you keep your promise to me and to your customers. The possibilities are unlimited. Millions will be sold this year. We teach you what to say, and how, when, where to say it. **INVESTIGATE.** It costs you absolutely nothing to learn about this opportunity. Don't delay. Territory is going fast. Write today, and give the name of your county.

ADDRESS SECRETARY,

THE NEVER-FAIL COMPANY, 985 Colton Bldg., TOLEDO, O.

Vehicles of the Air

By VICTOR LOUGHEED

Member of the Aeronautic Society

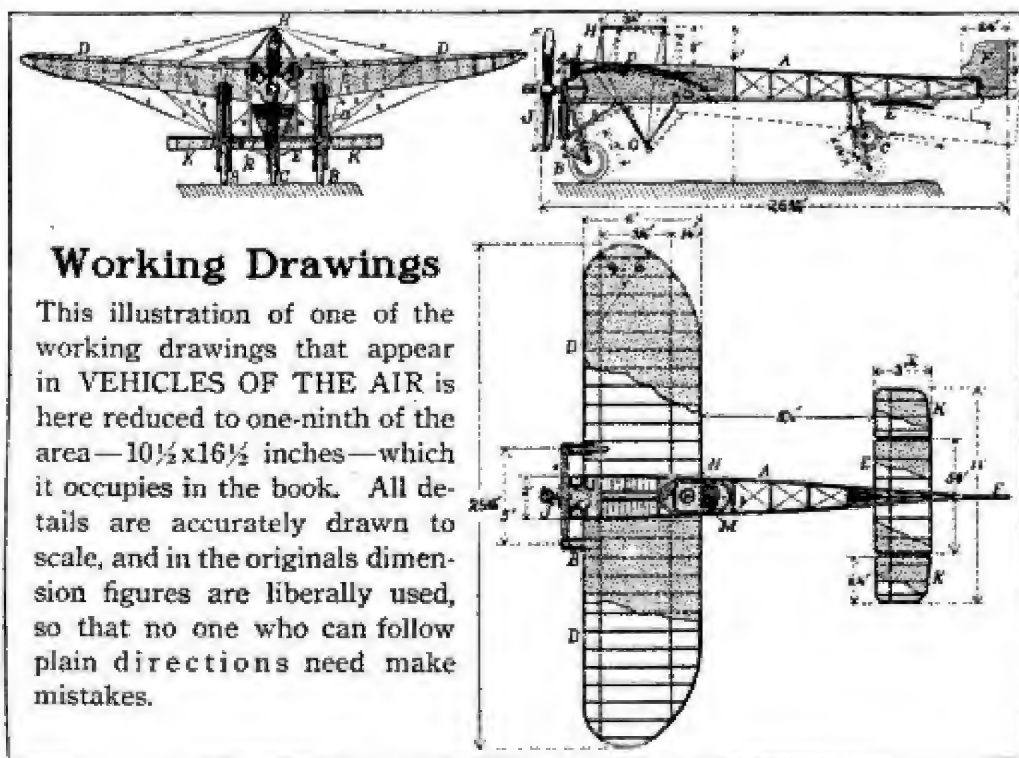
Founder Member Society of Automobile Engineers

A Popular Exposition of Modern Aeronautics with Working Drawings

550 pages. Bound in cloth, handsomely stamped in gold. Size $9 \times 5\frac{3}{4}$ in. Sent on receipt of price, \$2.50 net. Postage 25c extra.

This book positively presents every known fact concerning aerial navigation and air vehicles—with working drawings.

Authentic—complete—up-to-the-minute—500 subject headings—200 aeronautical terms defined—270 illustrations, including working drawings of machines and parts—140 halftone views—history of 1000 flights, with tabular comparisons of successful flying machines.



Working Drawings

This illustration of one of the working drawings that appear in **VEHICLES OF THE AIR** is here reduced to one-ninth of the area— $10\frac{1}{2} \times 16\frac{1}{2}$ inches—which it occupies in the book. All details are accurately drawn to scale, and in the originals dimension figures are liberally used, so that no one who can follow plain directions need make mistakes.

Figure 197—Scale Drawings of Bleriot Monoplane Number XI

Make Your Own Flying Machine

The author fully treats all phases of aerial navigation—with particular attention to modern types of successful aeroplanes. With the information afforded by this book any one of ordinary mechanical abilities, and with very little money, can build and operate machines of known flying capabilities.

FOR SALE BY

POPULAR MECHANICS BOOK DEPT., 225 Washington St., Chicago



SOMETHING ENTIRELY NEW IN STEEL TAPE MEASURES (PATENTED). ALMOST GIVING THEM AWAY AS SAMPLES, TO INTRODUCE THEM QUICK.

30 day offer for one 50 foot Pat. Steel Tape with or without Patent Angle Attachment, DELIVERED FOR \$2.00 (check, money order or postage stamps). Tape worth \$4.00; Angle Attachment \$1.00. Most valuable measure ever put on the market. If it does not prove satisfactory after 30 DAYS TRIAL, we will receive it back at our expense and return your money. Refer you to any of the Mercantile Agencies or to any of our local banks. Send for description and catalogue.

50 ft. Steel Tape Delivered \$2.00

JUSTUS ROE & SONS, Patchogue, New York


PRICE \$7.50 UP



Make \$20 a Day

with our wonderful **Champion Picture Machine**. Takes, develops, finishes photo in half minute; 300 an hour. No dark room. *Experience unnecessary.* Photo Post Cards and Buttons all the rage! You coin money anywhere. Small investment; big profits. Be your own boss. Write for Free Book. Testimonials, etc.

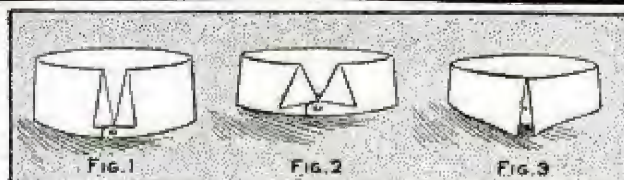
AMERICAN MINUTE PHOTO CO., Dept. 34, Chicago, Ill.



QUICK, THOROUGH ELECTRICAL INSTRUCTION

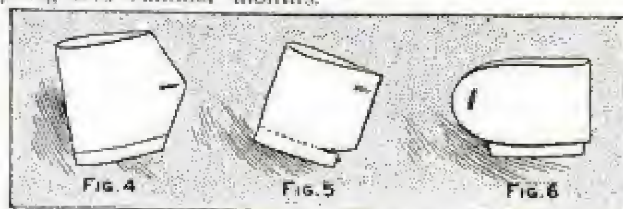
A complete college course in two years. Time and money saved. Taught by graduate engineers. Practice on apparatus and machines—construction, operation and repair. Every branch of generation, transmission and application. Graduates in leading electric companies. New classes July and September. Write for details.

BRYANT & STRATTON COLLEGE
No. 111, College Bldg., Buffalo, N. Y.



NEW STYLES IN COLLARS AND CUFFS

The wing collar with round corners is now being replaced by the pointed wing shape for all formal occasions. The more conservative shape (Fig. 1) is cut high with a rather narrow opening, while the second choice (Fig. 2) is much lower with wide wings. The straight-cornered turnover collar (Fig. 3) is for ordinary wear during spring and summer months.



The new designs in cuffs are being worn in London and Paris. Fig. 4 has triangular-shaped ends with the buttonholes in the center. Fig. 5 has the wristband partially cut away from the balance of the cuff, and Fig. 6 is a new double cuff having a decided curve. The latter is worn with fancy evening dress and eccentric morning coats.

WHEN YOU WANT ANYTHING AND DON'T KNOW WHERE TO FIND IT
WRITE BUREAU OF INFORMATION,
POPULAR MECHANICS CHICAGO

Prest-O-Carbon Remover



Cleans Out Any Gas Engine

Automobile, Motor Boat, Motorcycle, or Stationary

Tearing an engine to pieces and scraping out the carbon is slow, hard work, and likely to do more harm than good.

Prest-O-Carbon Remover, injected in the cylinder, loosens and removes all carbon from cylinder walls, piston, piston rings and valves. Cleans a cylinder perfectly in an hour for 25 cents or less. Increases compression, power and durability. Has no effect whatever on metal—cannot injure the engine in any way. We guarantee this. Easy to use—directions on can.

Try It Under This Guaranty:—

There are many imitations of our preparation, so, to make sure you get the genuine article, send us your order and we will ship you, express prepaid. (Quart. \$1; Half Gallon, \$2; Gallon, \$3.75.) If you are not fully satisfied with the results, simply tell us and we will promptly refund your money.

The Prest-O-Lite Co. 295 E. South St.
Indianapolis, Ind.
(Makers of Prest-O-Lite Gas Tanks.)

PATENTS

INVENTORS are invited to communicate with **Munn & Co., 359 Broadway, New York, or 625 F Street, Washington, D. C.,** in regard to securing valid patent protection for their inventions. Trade-Marks and Copyrights registered. Design Patents and Foreign Patents secured.

A **Free Opinion** as to the probable patentability of an invention will be readily given to any inventor furnishing us with a model or sketch and a brief description of the device in question. All communications are strictly confidential. Our **Hand-Book** on Patents will be sent free on request.

Ours is the **Oldest** agency for securing patents; it was established over sixty-five years ago.

MUNN & CO., 359 Broadway, NEW YORK
Branch Office, 625 F St., Washington, D. C.



MADE IN ONE MONTH WITH A "LONG" Popcorn Crispette Machine

You might just as well make as much. Perrine, Cal., took in \$380 in one day. Every nickel brought almost 4 cents profit. Start in this safe, profitable and fascinating business. Best season just at hand. You can make lots of money this Spring and Summer at Fairs, Parks, Summer Resorts, Amusement Halls, Circuses, etc. **Crispettes are fine**—different in shape, taste and quality. Everybody—young and old craves them. Sell for 5c a package—popular price—easy to get money. Think of fortunes made in five cent propositions—then figure what you can do. **Write me today.** Get full particulars—reports from others. Act upon the prompting you have—now—address

W. Z. LONG, 237 High Street, Springfield, Ohio

Mechanical Handbooks at 25 cents each

Inventions

How to Protect, Sell and Buy Them. By Frederic B. Wright, Counsellor in Patent Causes. This book is especially written for the use of inventors, instructing them how to place their inventions before an attorney clearly; the rights given them under the law, patent specifications, legal forms, and the many points necessary for an inventor to know to protect himself under the American laws. The most practical and clearly written American book on this subject, especially intended for the uninitiated. 114 pages and 1 sample pattern drawing.

How to Build a 20-ft. Biplane Gliding Machine

that will carry a man. By A. P. Morgan. A practical handbook on its construction and management. Enabling an intelligent reader to make his first step in the field of aviation with a comprehensive understanding of some of the principles involved. Fully illustrated with detailed drawings.

The Slide Valve Simply Explained

A practical treatise for locomotive engineers by W. J. Tennant, revised and enlarged by J. H. Kincaid. Contents of Chapters:—Introduction, 1. The Simple Slide, 2. The Eccentric, A Crank, Special Model to Give Quantitative Results, 3. Advance of the Eccentric, 4. Dead Center, Order of Cranks, Cushioning and Lead, 5. Expansion—Lap and Lead; Advance, Compression, 6. Double Ported and Piston Valves, 7. The Effect of Alterations to Valve and Eccentric, 8. Notes on Link Motions, 9. Cut-Offs, Reversing Gears, etc. 89 pages, 41 illustrations.

Management of Boilers

The Fireman's Guide. A Handbook on the Care of Boilers. By K. P. Dahlstrom. Especially written in plain English for the use of beginners and firemen. Contents of Chapters:—Introduction, 1. Firing and Economy of Fuel, 2. Feed and Water-Line, 3. Low Water and Foaming or Priming, 4. Steam-Pressure, 5. Cleaning and Blowing Out, 6. General Directions, Summary of Rules.

Diagram of Corliss Engine

A large engraving giving a longitudinal section of the Corliss engine cylinder, showing relative positions of the piston, steam valves, exhaust valves and wrist plates, when cut-off takes place at $\frac{1}{4}$ stroke for each 15 degrees of the circle. With full particulars, Reach-rods and rock shafts. The circle explained. Wrist plates and eccentrics. Explanation of figures, etc. Printed on heavy paper, size 13 in. by 19 in.

Model Steam Engine Design

A handbook for the designer of small model steam engines, including original tables and calculations for speed, power, proportions of pumps, compound engines and valve diagrams. By Robert M. De Vignier. Contents of Chapters: 1. Various Types, 2. Speed of Model Engines, 3. Power Calculations, 4. Materials, 5. Feed Pumps, 6. Compound Engines, 7. The Valve Diagram, 8. Engine Layout, Patterns. 102 pages, 34 illustrations.

Woodwork Joints

How to make and where to use them. A new revised and enlarged edition. Contents of Chapters: 1. Mortise and Tenon Joints, 2. Lap Joints, 3. Dove-Tail Joints, 4. "Glue" Joints, 5. Scarfing Joints and Joints for Lengthening Timbers, 6. Circular Work, showing how to make Joined Woodwork Frames in the form of Ovals and Circles. The work describes clearly the construction of the principal joints used in carpentry and joinery, and shows not only how to set them out, but indicates for what purpose they are best suited. 101 pages, 178 illustrations.

Sent postpaid upon receipt of price by

Popular Mechanics Book Dept.
225 Washington Street CHICAGO

Has lack of early mechanical education stood in your way?

If so, you will appreciate this book

HANDBOOK FOR MECHANICS

By FRANKLIN E. SMITH, M. E.

PARTIAL CONTENTS

ARITHMETIC

Being a concise and careful explanation of the first principles.

FORMULAS

Explaining in a simple way signs, characters and methods of solution.

MENSURATION

Giving methods for calculating areas and volumes.

WEIGHT

Showing how to get weights, contents of vessels, areas, etc.

SIMPLE MACHINES

Explaining the lever, pulley, inclined plane, wedge, screw, etc.

STRENGTH OF MATERIALS

Rules for the calculation of working stresses, factors of safety, and other stresses, etc.

324 Pages

Price \$1.50 net

127 Illustrations

Postage 12c extra

FOR SALE BY

POPULAR MECHANICS BOOK DEPT.

225 Washington Street, CHICAGO

Behind the Scenes With the Mediums

By David P. Abbott

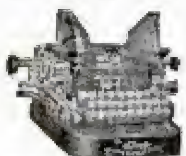
328 Pages, Cloth, Gilt Top. Price \$1.50 Postpaid

A BOOK which will hold the reader's attention strongly with its marvelous expose of the secrets of mediumistic work. One trick follows another in rapid succession until the reader is ready to ask, "Will wonders never cease?" Yet the explanation closely follows the mystery, so that all is made simple after all.

A delightfully entertaining book which should be in the hands of all lovers of the mysterious. Among the contents are: Mediumistic Readings of Sealed Writings, Spirit Slate-Writing and Billet Tests; Modern Sorcery; Some Unusual Mediumistic Phenomena; Materialization, Relation of Mediumship to Palmistry, Astrology and Fortune-Telling; Performances of the Annie Eva Fay Type; Vest-Turning; Handcuff Trick, etc.

The author, Mr. Abbott, being a practical performer himself, although not a medium, has included only up-to-date secrets that are thoroughly professional and practical, and such as are being used to-day in mystifying an innocent public. Sent postpaid on receipt of price by

Popular Mechanics Book Dept.
CHICAGO

TYPEWRITERS ALL MAKES

Extra Special No. 3 Olivers, rebuilt, good as new, \$42.50 cash or \$45.00 on installments, easy terms. All other Standard Machines, including **Visibles**, at equally low prices. **Bargains in No. 2 Smith Premiers, Fay Sholes, etc.**

PRICES: \$15.00 AND UP

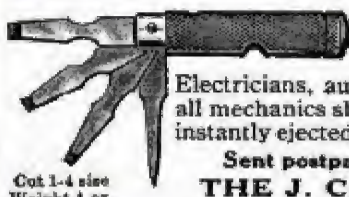
5 days free trial or rented, rental to apply on purchase. Send for Catalogue. Address

ROCKWELL-BARNES COMPANY, 1296 Munn Bldg., CHICAGO

FINANCING AN ENTERPRISE

A work on practical financing by Francis Cooper. Two volumes. Rockram. These books by a successful promoter of 15 years' experience, have the endorsement of prominent business men. Third edition—540 pages. Full information regarding the securing of patents, raising money, incorporation, prospectus writing. Price \$4.00 for both books, prepaid. Money back if not satisfied. Circulars free.

Ronald Press Co., Dept. D, 229 Broadway, New York

**THE COMET POCKET TOOL SET**

Electricians, automobilists, plumbers and all mechanics should have this tool. Blades instantly ejected by quarter turn of end cap.

Sent postpaid on receipt of \$1.00

THE J. C. BARRETT CO. HARTFORD, CONN.

Cut 1-4 size
Weight 4-oz.

HOW MACHINERY BREATHES—An English writer on engineering subjects, Mervyn O'Gorman, calls attention to the fact that a piece of machinery, such as an automobile, laid aside after being used, is in danger of internal rusting through a kind of respiration which affects cylinders, gear boxes, clutch chambers, interspaces in ball bearings, and so forth.

Every enclosed air space "breathes" by drawing in air when a fall of temperature contracts its walls, and expelling it when the walls expand through heat. The moisture introduced with the air is deposited in the cavities, and may produce serious damage through rust. The popular belief that oil will protect the inaccessible parts of unused machinery is fallacious, since nearly all oils take up about 3 per cent of water in solution.—*Youth's Companion*.

COMPLETE FILES OF
Popular Mechanics Magazine
FOR 1910

Consisting of the twelve issues of the magazine and a very complete index. Suitable for binding. Supply limited.

May be had while they last at the price of \$1.50 postpaid.

Popular Mechanics Co. 225 Washington St. CHICAGO

Six Months to Pay

You will be surprised and delighted when you receive your copy of the latest edition of Woolf's Encyclopaedia of Bargains—now fresh from the presses. This book will prove to you that you may be a style leader among your friends—wear clothes of absolutely proper perfection—and pay for them in little sums just as is most convenient to you. We allow you six full months in which to pay for anything you buy of us, and as we are one of the

Largest Establishments of This Kind in the World

we absolutely guarantee perfect satisfaction or your money back.

Ladies' Suits, Skirts, Waists, Petticoats, Hair Goods, Coats, Dresses, Corsets, Underwear, Millinery, etc., etc.

Men's Suits, Raincoats, Overcoats, Top Coats, Hats, Trousers, Vests, Coats, etc., etc.

We Ship on Approval

We were the first concern to offer wearing apparel on credit by mail. We have thousands of satisfied customers all over the country. Our transactions are absolutely confidential.

Send Your Name at Once

for this beautiful Encyclopaedia of bargains.

Ask for your free copy of Book No. 44. Address

WOOLF'S INCORPORATED
Dept. 959, Douglas Park Station, Chicago

This beautiful two-piece, all worsted, Oxford gray, self-striped, fashionably tailored Spring Suit \$10.95
Cash with order \$2.75. Monthly Payments, \$1.40

Solar—The Quality Lamp

is used on 80 per cent of the quality cars made in America.

It's used because it's the one reliable, dependable lamp—the only lamp that for service and beauty would not cheapen the car itself.

You can have Solars, too, if you insist on them when you buy your car. "If you don't use a Solar we both lose."

BADGER BRASS MFG. COMPANY

Kenosha, Wis.

(38)

New York City

\$18 to \$30 a Week Sure

Farmers "Ever Ready" Tool Kit does it

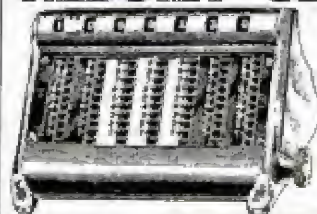
10 TOOLS

IN ONE

Agents going wild over results. M. Snyder made \$46 in 2 hours. Joseph Pine took 65 orders in 2 days. M. D. Finch sold 42 in 9 hours. Had no experience. You can do it. To show it means a sale. **FREE SAMPLE to workers.**

FOOTE MANUFACTURING CO., Dept. 260, Dayton, O.

WHEN YOU WANT ANYTHING AND DON'T KNOW WHERE TO FIND IT
WRITE BUREAU OF INFORMATION,
POPULAR MECHANICS CHICAGO

REBUILT GEM ADDING MACHINES AT \$5 AND \$10

You can't afford to add up columns of figures with a pencil when you can now buy a rebuilt Gem Adding Machine for \$5 or a better one for \$10. These machines are exactly like the one illustrated. It will do more work than several clerks—do it quickly, and do it right. It is error-proof. These machines are guaranteed to be in perfect working order.

Satisfaction Guaranteed or Money Refunded in 10 Days

Firms whose business requires larger, more intricate machines for subtracting, dividing, etc., trade these old Gem machines back to us. We build them over—making them practically new—and sell them at just enough to cover the cost to us.

In this way you can get an excellent adding machine at a trifling cost.

Send your order with your check today, and if you are not satisfied after ten days trial return the machine and your money will be refunded without question. Order at once—the supply is limited.

E. JOSEL, Rebuilt Adding Machine Co., 319 Broadway, NEW YORK CITY

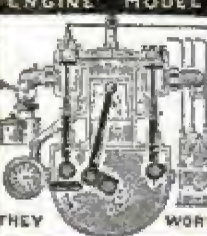
LEARN TO RUN AND REPAIR AUTOMOBILES FOR



MAGNETO MODEL



ENGINE MODEL



It's easy with Dyke's New System from London—the original and only system—using real Working Models. My Home Study Course consists of: 29 Instructions, 112 Books 120 Charts—and the models—free. It costs but \$10—now—others charge \$20 to \$80 for less. Everything sent at once—on approval—diploma when finished.

Write today and let us show you what hundreds say who are now earning big salaries.

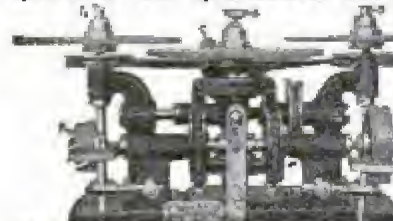
Our 24 page Book tells you: "How to get into the Auto Business" in don't miss it—it's free. A. L. DYKE, BOX 1-3847 Washing'ton, St. Louis

MANIKIN OF AN AUTOMOBILE



YOU CAN TAKE IT APART AND SEE HOW AN AUTO IS CONSTRUCTED.

\$5.00 to \$10.00 A Day Made Easy



The "American" No. 3 Patented

Hones razors, sharpens all kinds of safety razor blades, clippers, scissors, etc. No make-believe, but the real thing. Complete outfit furnished with instructions how to do the work. No previous experience required.

Address, Mgr. Dept. 408, Illinois Cutlery Company, 171 Washington St., Chicago

\$13,245 in 110 Days \$30,000 in 9 Months

Amount of orders from R. V. Zimmerman, Indiana, farmer (address upon request), for our

NEW INVENTION

First experience as a general agent. M. Stoneman, Nebr., artist (address upon request), sparetime orders total

OVER \$15,000.00

One order exceeds \$6,000. "Best thing ever sold. Not one complaint from 2,000 customers."

C. A. Korstad, Minn. (address upon request).

Orders \$2,212 Worth in Two Weeks

Hundreds enjoying similar prosperity. Agents breaking all records—actually getting rich. Let us refer you to 10 more whose total orders exceed \$51,000. To hundreds like O. Schleicher, Ohio

(minister), whose first 12 hours' work sold 30 outfits (profit \$81.90). A. Wilson, Ky., who ordered \$4,000 worth and sold 102

in 14 days (profit \$278.40). J. Hart, Texas, \$5,000 worth and sold 16 in 3

hours (profit \$43.68). Reese, Pa. (carpenter), solicited 60 people—sold 55. Reader, these results possible for you, at home or travelling,

as exclusive agent for Allen's Wonderful Bath Apparatus. New, powerful, irresistible. Truly wonderful. Gives every home a modern bathroom for only \$6.50. Abolishes tubs, bowls, buckets, wash rags, sponges. Supplies hot or cold water in any room. No plumbing, no water works, self-heating, makes bathing 5 minutes operation. Easily carried from room to room. Child operates easily. Means no more cold rooms, drudgery, lugging water, filling tubs, emptying, cleaning, putting away. No wonder agents without previous experience make small fortunes, buy homes, have an automobile, bank account. Average 8 orders to every 10 families. Fascinating, dignified, exciting work.

Free Sample, Credit, Liberal Terms to active agents. Don't hesitate—business supplies capital. Investigate by all means. Address postal today for full details.

ALLEN MFG. CO., 3303 Allen Building, TOLEDO, O.

LEARN AUTOMOBILE BUSINESS

Demand for our graduates as chauffeurs, automobile salesmen and repairmen exceeds supply. We teach 8 branches of the business by mail in 12 weeks, furnishing you employment from which you should earn more than enough while studying to pay for course. Only school that loans each student working model of automobile while studying and gives preparatory training for auto factories. Write for Plan F

Automobile College of Washington, Washington, D. C.

ELGIN WATCHES ON CREDIT

Special This Month \$16.50
17-Jewel Genuine ELGIN IN 20-YEAR GOLD FILLED CASE only
Sent PREPAID On Free Trial at Our Special ROCK BOTTOM WHOLESALE PRICE.

Let me send you this Beautiful Genuine 17-Jewel Elgin Watch Complete in 20-Year Gold Filled Case—the BIGGEST BARGAIN Ever Offered!

NO MONEY DOWN \$2 A Month
\$2.50 After Examination.

You Assume No Risk Whatever in Dealing With Us

because before you buy or pay one cent, we place the watch right in your own hands and let it do its own talking. We ask **NO SECURITY and NO INTEREST**—just plain honesty among men. Our Elgin Watches are so well known and our CREDIT PLAN so easy, that no matter where you live or how small your wages, **WE WILL TRUST YOU**, so that you and every honest man and woman can own a **DIAMOND or High-Grade Elgin Watch** in a beautiful Guaranteed 25 year Gold Filled Case and wear it while paying for it in such small payments that you never miss the money. **Write today for our Big Free Watch and Jewelry Catalog.** It tells all about our easy credit plan and how we send Elgin 19-Jewel B. W. Raymond and 21 and 23-Jewel Elgin Veritas everywhere on Free Trial, without security or one cent deposit, positively Guaranteed to Pass Any Railroad Inspection.

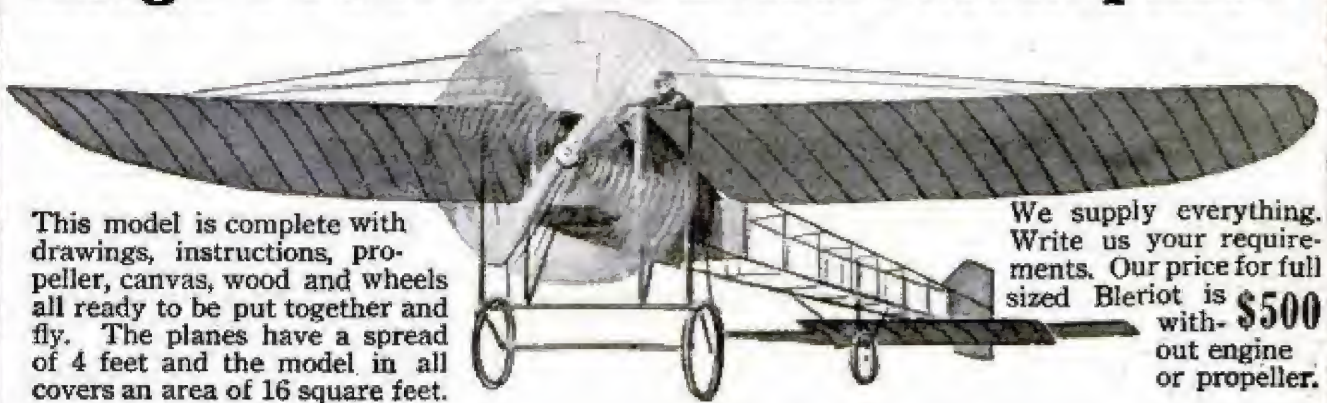
HARRIS-GOAR CO. Dept. 75 KANSAS CITY, MO.

The House that Sells More Elgin Watches than Any Other Firm in the World.



**WATCH AND
DIAMOND
BOOK FREE**
Write For It.

SEND US A \$2 BILL FOR THIS Large 4-Foot Model Bleriot Monoplane



This model is complete with drawings, instructions, propeller, canvas, wood and wheels all ready to be put together and fly. The planes have a spread of 4 feet and the model in all covers an area of 16 square feet.

We supply everything. Write us your requirements. Our price for full sized Bleriot is \$500 with- out engine or propeller.

**B
L
E
R
I
O
T**

H. G. Carter, designer of this model, is the well known English aviator and has been associated with aerial navigation for over 15 years. He has made 18 parachute descents from balloons, holding the world's record for 6,000 feet, made at Blackpool, England, in 1905. Mr. Carter flies a machine of his own construction, having made 27 trial flights and having established an official record of 62 miles in 57 minutes.

**\$2 EACH
POST
PAID**

Send us a two dollar bill and we will send you this LARGE MODEL ready to be put together.

**\$2 EACH
POST
PAID**

CARTER & SON, Aviators and Manufacturers

201 Bennett Bldg., 99 Nassau St., NEW YORK

**M
O
N
O
P
L
A
N
E**

THE PARENT OF RADIUM—If the earth, says an eminent authority, were supposed to have been composed, initially, of pure radium, the activity 20,000 years later would not be greater than the activity observed in pitchblende today. But, since there is no doubt that the earth's age vastly exceeds 20,000 years, it is necessary, in order to account for the existence of radium at all in the earth, to suppose that it is continuously produced from some other substance. At the present time it seems most probable that uranium is this parent substance. The observed activity in a good specimen of pitchblende is about what should be expected if the uranium contained in it spontaneously breaks up into radium. Radium itself is continuously transformed into an emanation which, in turn, is changed into other types of matter, and there is no evidence that the process is reversible.—Illustrated Sunday Magazine.

We are pleased to note that the "Olympic," the largest vessel on the ocean, is to be devoted to the uses of commerce instead of to war.—Chicago News.

Sell Yourself a Typewriter

SAVE \$50—5 DAYS' TRIAL

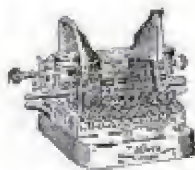
You can earn \$50—the average cost of selling in person—by selling yourself a typewriter. We will send a No. 3 Oliver (visible writer) on 5 days' trial without any deposit. If you find it the best typewriter ever made, send us \$5 monthly for ten months. That's half the usual Oliver price.

We buy these machines by the thousands, direct from the makers, and we sell without agents. Our book, "Typewriter Secrets," tells the whole story. Ask us now to mail it.

TYPEWRITERS DISTRIBUTING SYNDICATE

705 Masonic Temple, Chicago

(7)



(This is the 16-foot Ideal)

Gile Launches

Here she comes! What a beauty! Shoots through the water like a torpedo! Look at her high freeboard and graceful curves! See how many passengers she holds!

Hulls of seasoned timber, stoutly built and sheathed inside. 16, 18, 20, 26-foot models. Famous 2-cycle, non-cranking Gile Engine—positively reversible—controlled by one lever—absolutely dependable. Engines and boat equipment sold separately, if desired.

Speedy, roomy, seaworthy, SAFE. Ideal for family use or personal pleasure. Sold at exceedingly low prices. Send for the catalogue? Sure, you will! Write us a postal to-day.

Special 16-foot Launch, \$87

GILE BOAT & ENGINE CO., 301 Main St., Ludington, Mich.

Dividends from 60% to 1300%

THE FIRST OPPORTUNITY FOR THE PRIVATE INVESTOR
TO PURCHASE AUTOMOBILE STOCK

THE automobile business is the most prodigiously successful business in the world today. Walter E. Flanders started in the automobile manufacturing business with a capital of \$195,000 and sold out in twenty months for \$6,000,000—a profit of nearly 3,000% in less than two years.

Talk about the "Arabian Nights"—the record of the automobile business in this country reads like a dream of wealth gone mad—a golden dream that would have crazed King Midas himself.

And as yet the automobile business is in its infancy.



Plant of the American Automobile Mfg. Co. at New Albany, Ind., opposite Louisville, Ky.—
Over 5 Acres Floor Space—Value \$200,000

General Motors, with a capital of \$16,000,000 earned dividends of \$12,000,000 net in 1909. In 1910 their dividends will probably amount to considerably more than 100 per cent.

The Chalmers Motor Company in 1910 declared a dividend of 30% in cash and 1000% in corporate stock.

The Reo Motor Car Company have paid over 90 per cent annually on their stock in the last five years.

A year ago the Cadillac Motor Car Company was sold to General Motors Company for \$4,570,000.

The net profits of this concern for 1910 were \$3,000,444 or about 63% on the amount paid for the plant,—which was considerably more than the amount invested by the original company.

There were 180,000 cars put out last year—total value \$240,000,000—

Yet the stupendous sum of \$2,902,338,000 was spent on horses and mules.

The automobile is finding new uses every day—agricultural and industrial.

And careful statisticians compute that to-day only 5% of possible business is being done by automobile manufacturers.

That means that twenty times as much business could be done than *is* done.

That means that were the number of automobile manufacturers doubled, there would be more than enough to keep all going without disturbing existing companies' business in the least.

That means the *permanence* of the automobile industry.

You can't buy automobile stock to-day.

A man would be a fool to barter his proprietary right in a dividend that ranges from 60% to 1300%.

And when a new company is formed you can't buy stock in it usually.

For usually the stock is issued in denominations of \$1,000 or more and the big men snap it up like hot cakes.

For they know automobile stock is absolutely gilt edged.

There has never been any automobile stock offered to the private investor until now.

Now it is offered—and we offer it.

The American Automobile Manufacturing Company is an established manufacturing concern, and has purchased the plant, machinery, patents, and all rights, titles, and interests of the Jonz Auto Co., manufacturers of the famous Jonz engines.

We own a big plant at New Albany, Indiana, as illustrated on preceding page.

This plant comprises about 5 acres of floor space—several big buildings valued at \$200,000.

We are manufacturing Jonz cars.

We already have \$450,000 worth of these cars ordered.

We require an additional fund for additional machinery and equipment to manufacture the cars already ordered, however—

And we are securing that fund by the sale of stock.

Contrary to the usual plan, we are not going to one or a group of financiers—

But we are going to the private investor.

Every stockholder becomes a partner in our business, with a voice and a vote in the direction of its affairs.

The stock being fully paid and non-assessable, no responsibilities are assumed by any stockholder. But each stockholder will boost the sales of the cars manufactured by his own

company. That's why we sell stock to the private investor.

We believe, too, that by having a great many stockholders in all walks of life all over the country, directly interested in our Company, that its prestige will be strengthened and its success assured.

The investment is absolutely safe.

You deal with business men and manufacturers, all of whom have purchased their own stock direct from the treasury of the Company. Not one share of promotion stock has ever been issued.

This is an investment in a substantial Industrial Concern in a business that pays dividends from 60% to 1300% and which, all told, is doing only 5% possible business at the present time.

The car—the Jonz—the best made because it has the simplest and most powerful motor. The patent owned in its entirety by this Company, thus insuring monopoly.

\$450,000 worth of these cars have already been ordered from us and must be built and delivered.

Dividends should be large and immediate.

Our Capital Stock is \$1,000,000, divided into two hundred thousand shares of the par value of \$5 each, fully paid and non-assessable.

If you have \$5, \$10, \$20 or \$100 or \$1000 that you would invest where it would be absolutely safe and where it would provide a maximum income immediately—with opportunity for still greater profits—fill in and cut out the attached coupon and mail it to us to-day.

We tell all about the proposition in our book—"From 60% to 1300% Dividends." Write for it.

The American Automobile Mfg. Co.,
408-12 Lincoln Bank Bldg., Louisville, Ky.

From 60% to 1300% Dividends Coupon for Popular Mechanics Readers

American Automobile Manufacturing Company,
408-412 Lincoln Bank Bldg., Louisville, Ky.

Gentlemen:—

Kindly send me your Book "From 60% to 1300% Dividends" relating to stock in the American Automobile Manufacturing Company.

Name.....Address.....

Town.....State.....

Please Mention Popular Mechanics



The Jonz—1911 Fore Door Construction



CHIEF DRAFTSMAN

Will INSTRUCT PERSONALLY a limited number selected, ambitious men in

Practical Drafting, Detailing, Designing

Draftsmen Drawing \$125-\$150 Monthly

Are NOT MADE in Schoolrooms,
Are NOT MADE by reading books,
Are NOT MADE by making Copies,
Are NOT MADE at home drawing pictures
from printed book lesson.

LET ME TELL YOU:

It requires actual, practical, up-to-date
DRAFTING-ROOM WORK to train YOU
to gain the PRACTICAL EXPERIENCE
that your employer will demand of you.



FREE

This \$13.85
DRAWING
OUTFIT

and Free Position.

As Chief Draftsman of Engineering firm I know exactly the Quality and Quantity of PRACTICAL training, knowledge and actual up-to-date experience (not school knowledge) you must have, in order to obtain a good position and advance to highest salary.

I give INSTRUCTION UNTIL COMPETENT and
PLACED in POSITION at above Salary.

DON'T waste TIME and MONEY trying to learn from books or printed "STUFF" you can only learn on PRACTICAL WORK which I furnish you.

Address CHIEF DRAFTSMAN
Div. 19, Eng's Equip't Co. (Inc.), Chicago



Instruction Book and Wood Finishing Samples **FREE**

HERE'S the best book ever published on artistic wood finishing, the work of famous experts, illustrated in five colors. For a limited time, we will mail it **FREE**, postage paid, together with samples of

Yes! You—yourself—can beautifully finish or refinish all furniture, woodwork or floors in the latest and most artistic shades—in little time—at small expense—with

**Johnson's
Wood Dye
and
Prepared
Wax**

If you are interested in craftsmanship—if you want the correct finish on a new piece of furniture—if you are *building or remodeling*—if you want to brighten up or change the color of any piece of furniture or of woodwork or floors—either hard or soft wood—if you are interested in basketry—get this expert Instruction Book and the **FREE SAMPLES** at your leading paint dealers.



**Johnson's
Wood Finishes**

Johnson's Wood Dye is made in many beautiful greens, browns, reds, etc. It is not a mere stain but a penetrating dye which colors the wood so deeply that if it becomes scratched or marred the natural color is not disclosed. It brings out the beauty of the grain without raising it, giving a soft, rich, permanent color. A coat of Johnson's Prepared Wax over the dye gives that beautiful, dull, artistic finish so much admired today. If you prefer a higher gloss than the wax gives apply a coat of **UNDER-LAC** over the dye and then one coat of Prepared Wax.

Under-Lac is a thin, elastic spirit finish very much superior to shellac or varnish. It dries hard in less than an hour. Under-Lac is just what you want for your linoleum and oilcloth; it brings out the pattern making it bright and glossy like new, protects it from wear and makes cleaning easy. It dries so the floors may be walked on in an hour.

We want you to try Johnson's Wood Finishes so we are supplying all leading paint dealers with samples for their customers' use. If your dealers haven't samples of our Wood Dye, Under-Lac and Prepared Wax and the Instruction Book—we will send them to you postpaid for the name of your dealer in paints. In writing us mention the shade of dye you prefer and Instruction Booklet, edition P A-4.

S. C. Johnson & Son, "The Wood Finishing Authorities" Racine, Wis.



In All Kinds of Weather

Kellogg's

TOASTED CORN FLAKES

Fresh — Crisp — Delicious

A New Supply Always at Your Grocer's

NONE GENUINE WITHOUT THIS SIGNATURE

W. K. Kellogg

